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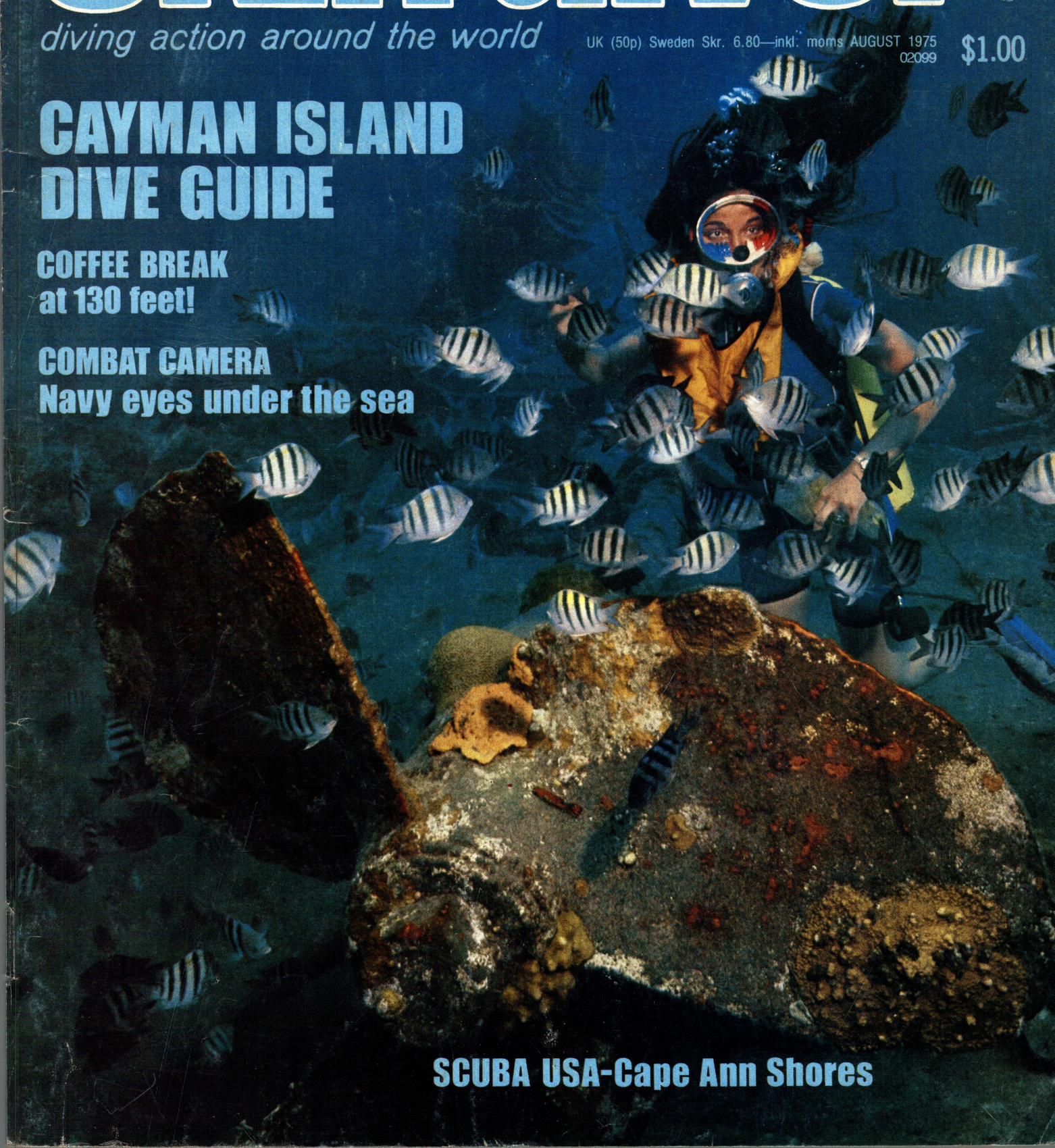
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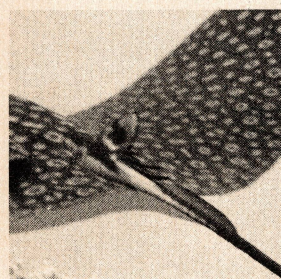
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30/Ready, Aim...



48/Ice Fog Pause



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Cover—Model Pat McKenney is shown feeding sergeant majors on the popular wreck, the Balboa, in a harbor off Georgetown on Grand Cayman Island. Jack McKenney took this photograph in 35 feet of water with a Nikonos 21mm, Kodachrome 64, and a Subsea strobe.

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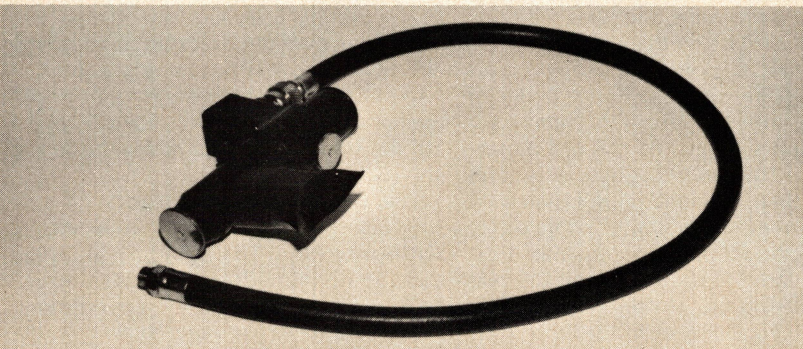


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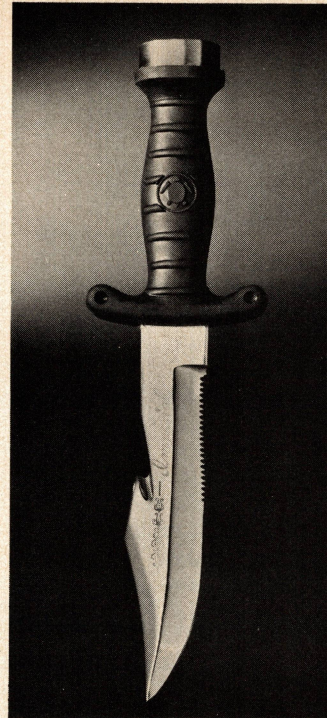
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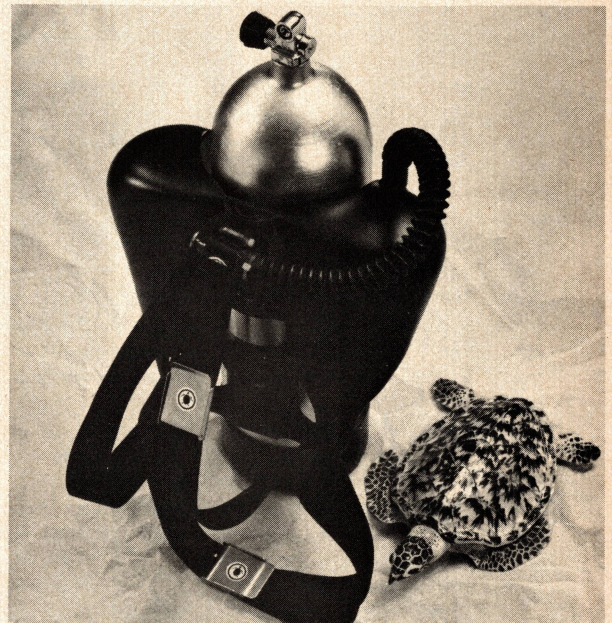
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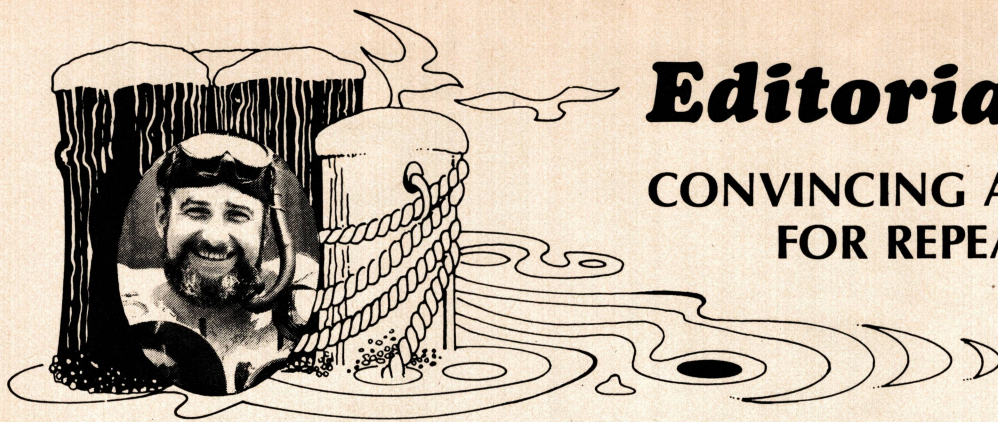
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# Editorial

## CONVINCING ARGUMENTS FOR REPEAL

by the Publisher

Concerned over the growing turmoil and apparent injury to sport diving caused by passage of the Scuba Diving Ordinance, Sy Greben, Director of the L. A. County Parks and Recreation Department, has requested a full report on the effects and problems currently surrounding this piece of legislation. As a result, Jon Hardy, a key member of the National Scuba Advisory Committee has compiled a new document entitled, "Report Justifying Repeal Of The L. A. County Diving Ordinance".

Taking time off from his duties as NAUI General Manager, Hardy devoted over 200 hours during a two-month period to the compilation and organization of this special report.

The result is a condensed report of 21 pages with 300 pages of substantiating references. Still another 300 pages of reports and materials have been submitted directly to department officials from the diving equipment manufacturers and other sources. Greben's initial request has resulted in a total of 621 pages of documentation — the largest and most complete argument for self-regulation ever assembled in the history of diving!

Divided into five major parts, the Hardy Report deals with such problems as, "Effects on the Diving Community, Questions Concerning Legislation, Specific Areas of Concern, Recommendations (for action), and Conclusions". It covers everything from present disenchantment of scuba instructors, to future predictions of bankruptcies.

Mixed in among the usual assortment of objections to government control are a few new arguments which have really hit home with government officials. These are the ones of greatest concern to Greben and his staff, for they are the ones who must shoulder this new burden of responsibility. Here are just a few sample problems revealed in the report!

One of the worst side effects of the County Diving Ordinance is the complete loss of public confidence. Concerned families will not permit their children to enroll in scuba training programs, even county-sponsored classes.

Certified divers are reluctant to go out on dive boats, and no one seems interested in taking up the sport. Enrollment and certification figures are way down.

It almost seems ironical that this county-sponsored ordinance has resulted in the virtual destruction of the county diver training program, a program in which the county has invested 20 years of hard work and hundreds of thousands of dollars for development.

One of the most painful points made in the Hardy Report was the obvious damage to the image and reputation of the Parks and Recreation Department. What had been started with all good intentions and concern for public safety has now turned into turmoil and bitterness against the department.

Another serious ramification of the ordinance is the current landslide of insurance problems. With the public's confidence destroyed, a sudden wave of law suits and insurance claims were instituted by surviving family members of scuba accident victims. Formerly safe and conscientious instructors found themselves under attack for no other reason than bad newspaper publicity. Reaction from insurance companies was equally swift and senseless. Fearing a rush on diving accident claims, they refused to renew current policies even though safety records were excellent. Stripped of their insurance protection, many instructors and boat operators may find it difficult to continue business. Those who remain may be forced to operate without insurance, or pay exorbitant policy premiums and pass the costs along to their customers.

One of the stickiest questions to surface in the Hardy Report is whether or not the county can afford the heavy administration expense of the ordinance. The task has turned out to be a far greater expense than originally anticipated. It will require more personnel, more office facilities, and far more money than presently allocated to the Parks and Recreation Department. Matters are further complicated by recent budget cuts within the department.

Added to this administration dilemma is the question of enforcement. Existing police and court systems are already overburdened with far more serious crimes. The open ocean within L. A. County jurisdiction covers thousands of square miles of virtually unpatrolled areas. Who is going to bear the staggering expense for more marine police, more patrol vessels, more fuel, more salaries, more court cases? Or will the Ordinance become one of those unenforceable laws which makes a mockery of our legislative system?

Along with the bad news cited in the Hardy Report, county officials were comforted in learning that passage of the ordinance has produced some positive and beneficial effects. It has most definitely brought about a new era of cooperation among manufacturers, shops, and instructional agencies. There is also a willingness to accept more responsibility for cleaning up past problems. Additional safety equipment has been put aboard dive boats, and boat crews are receiving training. More emphasis is being placed on visual tank inspections, presenting proof of certification, and the logging of open water dives.

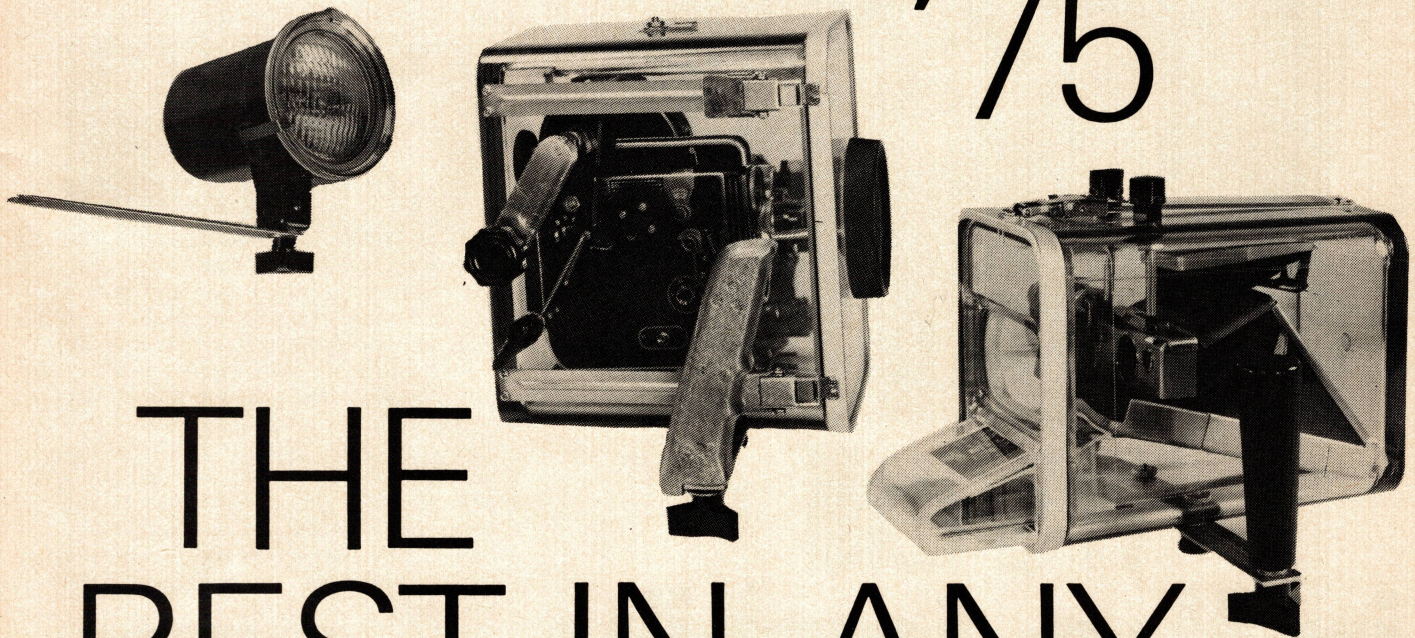
Perhaps the greatest single outgrowth of the ordinance is the formation of the National Scuba Training Council, comprised of the leaders of NASDS, NAUI, PADI, and YMCA. Development of a new code of ethics for instructors and a nationwide system for monitoring training classes is already in the works.

As this very issue of SKIN DIVER goes to the printer, L. A. County officials are pondering over the data contained in the Hardy Report. It is not merely a stack of papers of a heap of words. Entwined with the facts and figures of this historic report are the hopes and dreams for the future survival of our sport.

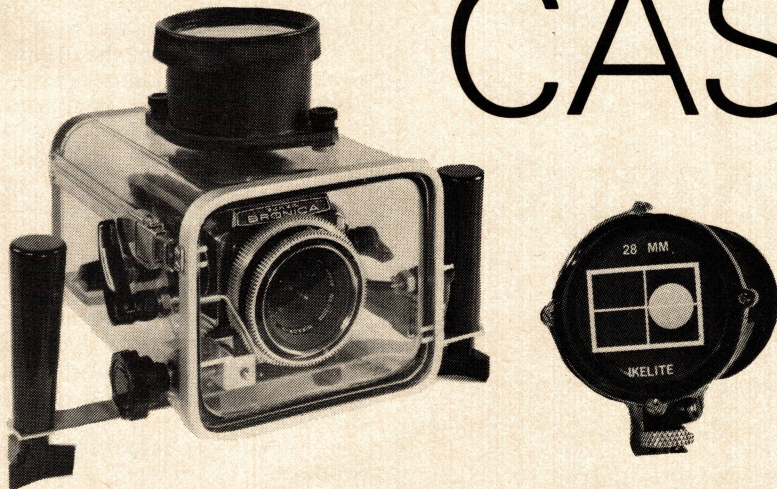
We pray that the County of Los Angeles sees the wisdom in repealing Ordinance No. 11037. And we also pray that the diving industry follows through on its promise of tighter self-government, should we be so fortunate to get this diving Ordinance repealed. ✻



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AUG-SD



... I was several paragraphs into your April '75 BioBriefs article before I realized you were telling about an old acquaintance that I haven't thought of for many years — "Paolo" Diaz. I guess I never knew that his real name was Apolonio ...

I rooted around in the attic and came up with the enclosed picture of Freddie



McAvoy, Dave Nason, Paolo and me on the dock of the old Bahamas Country Club. Those are pretty good sized grouper considering that, at that time, we were making our own spears out of 1/4" rod, bamboo poles, and innertube strips.

Your article was the first I realized that Paolo died of the bends in 1957. He was not only a magnificent athlete, but a gentleman in the truest sense of the word. I'm sure you'll hear from many other readers who had the pleasure of Paolo's friendship and guidance in the early years of our sport.

CHUCK COLLINS PEPPER PIKE, OHIO

... A recent article in the September-October 1974 issue of the Journal of Sports Medicine authored by Captain Behnke and Mr. Austin should be brought to the attention of all scuba divers, especially the instructors ...

"It is apparent that maximal expiratory effort to residual or near residual volume, coupled with hydrostatic compression of the lower lobes of the lungs and shift of blood into the thorax could result in trapping of potentially dangerous volumes of air. During rapid ascent, over-expansion of trapped air could produce emphysema of the lung tissue and emboliation of the vasculature."

I had two cases of air embolism this summer for which I could give no explanation until this article appeared. In both cases the victims claimed they were exhaling all the way up and were corroborated by their instructor who ascended with them ...

T. HATTORI, M.D. PACIFIC GROVE  
MARINE RESCUE PATROL

... There was an error in the July issue, Industry News, page 61. The man pictured on the left, Francis E. Skop, is the marketing manager for Sherwood Selpac, as the copy states, and the man in the middle, Orin Lindquist, is the president of this company. Captions for their positions were incorrect.



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**DIMENSION 2**



... I would like to offer an opinion on an article in your April issue entitled "The Dope on Drugs and Diving." I feel that any diver who feels that he gets a kick out of smoking weed while diving should not be considered a scuba diver. If the diver doesn't know that all of his reflexes and mind must be in clear working order while diving he should think twice before entering the water ... Can you imagine the disaster that would happen if the diver had to make a free ascent under the influence of weed? Also, a person should think that the problems of nitrogen narcosis is bad enough without any drugs provoking it any further.

I am a diver who got involved in using antihistamine because of inflamed sinus cavities. Therefore, I would like to tell of my problems. I found out that antihistamines caused severe aftereffects mainly within the area of the eyes and nose. Blurred vision and almost a constant nose bleed occurred also ... I have consulted several physicians and they agree that using antihistamines and diving don't jive ...

W.E. HANCSAK W. MIFFLIN, PENNA.  
See the article on page 54 in this issue.

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... Your magazine featured a recent story about making \$160 a day. The story pointed out that a diver could make \$160 a day harvesting sea urchins. I found the feature to be misleading and inaccurate. It gives the allusion that urchin divers earn \$160 in a day for harvesting a ton of urchins. That allusion may send many unemployed scuba divers to the sea with high hopes, but I wish to inform those with such intentions to take a good look at the industry ...

Last year most of the divers from Santa Barbara and Morrow Bay formed an organization named California Urchin Divers Association. Their purpose was to boycott any buyer paying less than two hundred dollars a ton. The reason for the boycott was that operating expenses had increased to the extent that the average diver was making only \$420 a month in gross wages. The pay did not compensate for 12 hours of hard work and the rigorous life in a day at sea. The boycott failed and the divers hadn't any choice but to return to work or quit. Things have changed very little since the boycott.

There are relatively few days a month allowing a diver work. The average is about 13 days because the weather, equipment breakdowns, and the urchin market prevent more harvesting time ...

Operating expenses are increasing at an alarming rate. Fuel costs keep rising and replacement parts cost more. The harvest is going on further from port each



# skin diver

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month because all of the nearby beds are depleted, most boats are making round trips from 50 to 100 miles a day . . .

Other costs of operations are: slip fees, insurance, license fees, property tax, taxes on earnings, crew's wages and boat payments. All the costs are on the increase, but urchin prices have decreased from \$200 a ton over the past year because competition has increased. All operation costs are taken out of the \$160 earned . . .

BRUCE ROBERTS

MISSION VIEJO, CA.

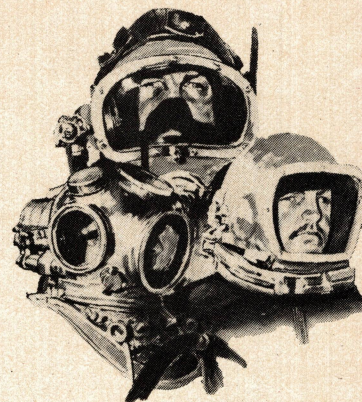
*. . . I don't think you fully realize that the sea urchin industry is a "fishery," and like the thousands of different fisheries throughout the world, subject to variables and fluctuations. There may be a good catch one day and a poor one the next. A lot depends upon the availability of the catch and the knowledge and ability of the fishermen. Equipment is important too.*

*It sounds as if your equipment could be more sophisticated. Rather than making round trips of 50 to 100 miles daily you might consider a larger, more practical vessel that could remain away from port for several days, similar to the menhaden and tuna boats.*

*Yes, the costs must be considered and as I mentioned in my article the National Marine Fisheries Service has information for prospective divers outlining costs and preliminary data . . . As more divers engage in this fishery, progress will evolve. Equipment will improve, new markets will open and new dive sites will be discovered. There's no doubt, the product is there. It's up to man and his ingenuity to develop it . . . ELLSWORTH BOYD*

*. . . I enjoyed Ellsworth Boyd's article on the sea urchin industry of California in the May '75 SDM. He did not mention what use, if any, is made of the sea urchin tests, spines, and other flesh. It seems to me that these wastes would make good chicken feed, if ground and dried.*

*KEITH ZEILINGER KAILUA, HAWAII . . . This is an excellent idea! You might check with some of the processing companies and see what they do with the wastes. You might also write to: Steele Culbertson, Executive Director, National Fish Meal and Oil Association, 1225 Connecticut Ave., N.W., Washington, D.C. 20036. NFMOA is the voice of the menhaden industry which processes these fish for chicken feed and fertilizer . . . ELLSWORTH BOYD*



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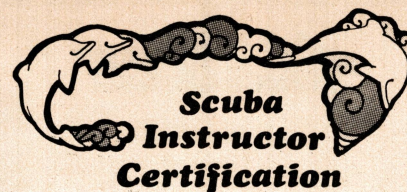


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August 8-10, 22-24 & Sept. 6-8  
YMCA Scuba Instructor Institute, Bradenton, Fla. (Contact: Mike Sorvick, 4200 Ironwood - Apt. 308B, Bradenton, Fla.)

Aug. 8-10, 23-24; Sept. 6-7  
YMCA Instructor Institute, Brunswick, Ga. (Contact: E. T. Wilcher, Jr., 1860 Kirkwood Dr., Macon, Ga. 31206)

August 9-17  
NAUI Scuba Instructor Certification, Norfolk, Va. (Contact: NAUI Mid Atlantic Branch, P.O. Drawer C, Deepwater, N.J.)

August 9-16  
PADI Instructor Training Course, Akron, Ohio. (Contact: Ed Arszno, Seaway Aqualung Centers, 26550 Grand River Ave., Detroit, Mich. 48240)

August 15-16  
YMCA-NAUI cross-over certification, Albany, N.Y. (Contact: Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, MA)

August 17-24  
NAUI Scuba Instructor Certification, Chicago, Ill. (Contact: NAUI Mid America Branch, 4409 Arden View Ct., St. Paul, Minn. 55112)

August 23-31  
NAUI Scuba Instructor Certification, Seattle, Wash. (Contact: NAUI North Pacific, 6531 N.E. 198th St., Seattle, Wash.)

August 30-Sept. 7  
NAUI Scuba Instructor Certification, Palm Beach Shores, Fla. (Contact: NAUI South Atlantic Branch, P.O. Box 10356, Riviera Beach, Fla. 33404)

August 31-September 6  
NAUI Scuba Instructor Certification, Santa Cruz, Calif. (Contact: Homer Fletcher, 2273 Cove Ave., Los Angeles, Ca. 90039)

September, October, November  
YMCA Scuba Instructor Institute, Houston, Texas. (Contact: Bill Bresett, 5805 Gulfon, Apt. 5, Houston, Texas 77036)

September 4-14  
PADI Instructor Training Course, Philippine Islands. (Contact: Roger Settle, DCA-SWP Clark AFB Pl, Box 16949 % APO San Francisco, Ca. 96274)

September 6-13  
NAUI Scuba Instructor Certification, Palm Beach Shores, Fla. (Contact: Glenn Taylor, P.O. Box 15933, West Palm Beach, Fla.)

September 13-14; Oct. 11-12; Nov. 8-9  
YMCA Scuba Instructors Institute, Dallas, Texas. (Contact: D. Pat Ryan, Town North YMCA, 4332 Northhaven Rd., Dallas, TX)

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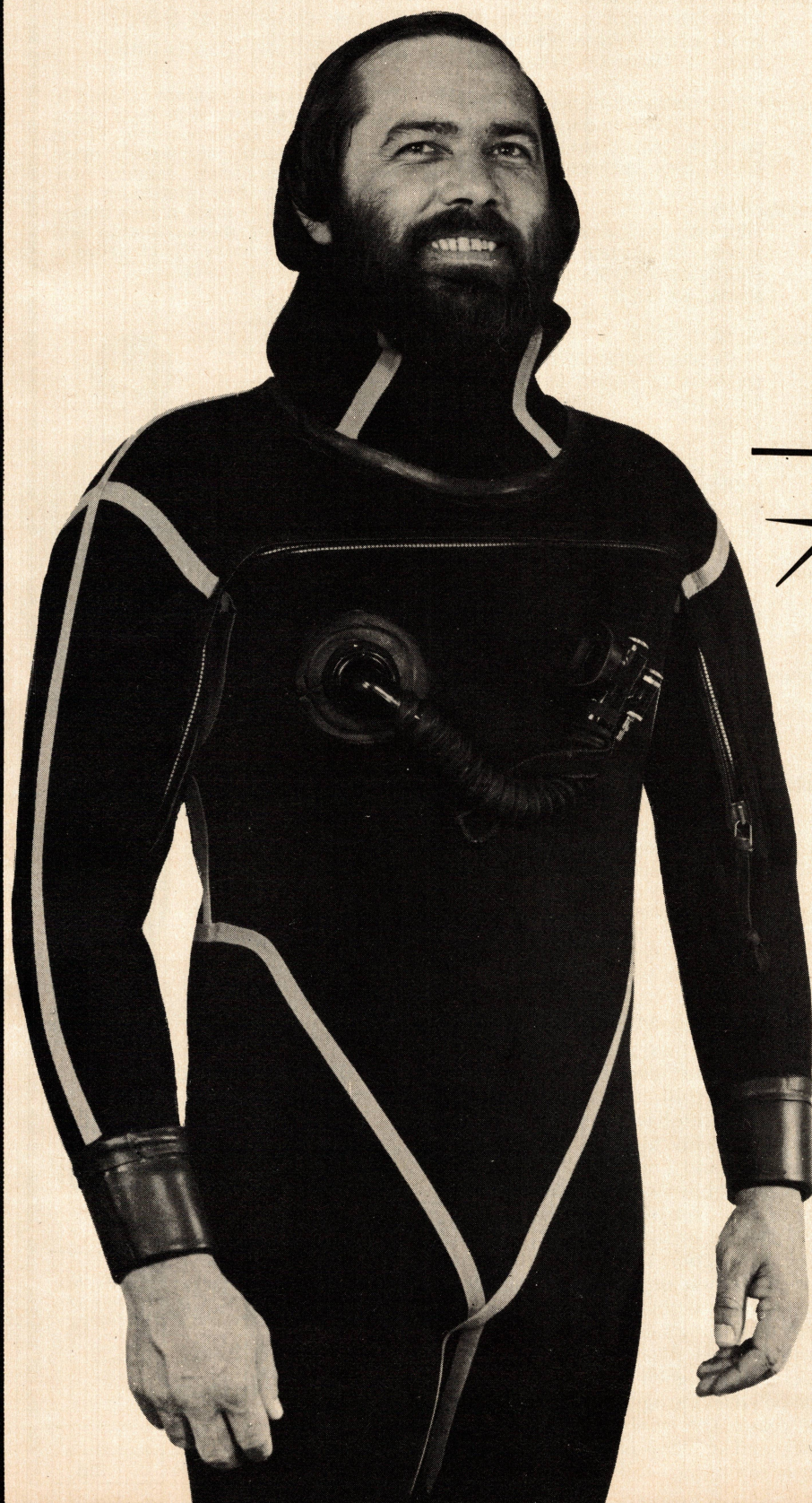
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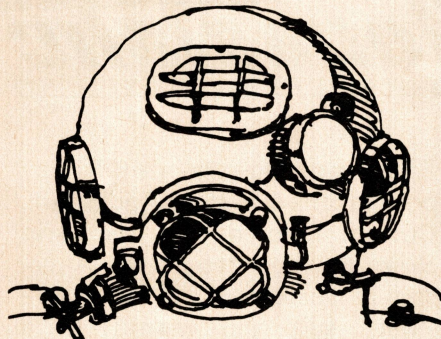
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YMCA Scuba Instructor Institute, New Jersey & Eastern Penna. (Contact: John Geary, 10-07 Bellair Ave., Fairlawn, N.J.)

September 27-28; October 18-19; November 22-23  
YMCA Scuba Instructor Institute, Indianapolis, Ind. (Contact: Tom Haver, 6001 Compton, Indianapolis, Ind. 46220)

September 27-October 5  
PADI Instructor Training Course, Jacksonville, Fla. (Contact: Robert Axelrod, PADI College, 4593 St. Johns Ave., Jacksonville, Fla. 32210)

October 3-5, 10-12, 17-19  
YMCA Scuba Instructors Institute, Newport News, Va. (Contact: Charles Dubay, 105 Allyson Dr., Williamsburg, Va. 23185)

October 4-5, 11-12, 18-19, 25-26  
PADI Instructor Training Course, Fayetteville, N.C. (Contact: John Valdes, 1906 Wayne Lane, Fayetteville, N.C. 28304)

October 11-12; 25-26; November 8-9  
YMCA Scuba Instructor Institute, Maine. (Contact: Joe Gallant, 41 Belmont St., Portland, Maine 04104)

October 11-18  
YMCA Scuba Instructors Institute, Mexico City. (Contact: Enrique Rodriguez, C Carbonera 129, Mexico DF 21, Mexico)

October 13-December 19  
PADI Instructor Training Course, 10 week resident, Jacksonville, Fla. (Contact: Robert Axelrod, PADI College, 4593 St. Johns Ave., Jacksonville, Fla. 32210)

October 24-26, November 21-23, December 5-7  
YMCA Scuba Instructors Institute, Orlando, Fla. (Contact: David Dunsworth, 433 N. Mills Ave., Orlando, Fla.)

## CHURCHILL MOVES

Johnson Machine and Tool Co., Inc., the manufacturer and distributor of the original Churchill Swim-fin has moved to 12525 S. Crenshaw Blvd., Hawthorne, Calif. Their new location will provide more space and a more modern facility.

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For the young swimmer the company manufacturers the Mini Pro Swim-fin which was designed for and will fit children between the ages of six months and five years. The Mini-Pro instills confidence and is made of a quality rubber that is gentle on small tender feet.

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- \_\_\_\_\_ Hips
- \_\_\_\_\_ Waist
- \_\_\_\_\_ Chest
- \_\_\_\_\_ Neck
- \_\_\_\_\_ Wrist
- \_\_\_\_\_ Forearm
- \_\_\_\_\_ Elbow
- \_\_\_\_\_ Biceps
- \_\_\_\_\_ Ankle to Knee
- \_\_\_\_\_ Ankle to Crotch
- \_\_\_\_\_ Ankle to Waist
- \_\_\_\_\_ Shoulder Seam to Crotch
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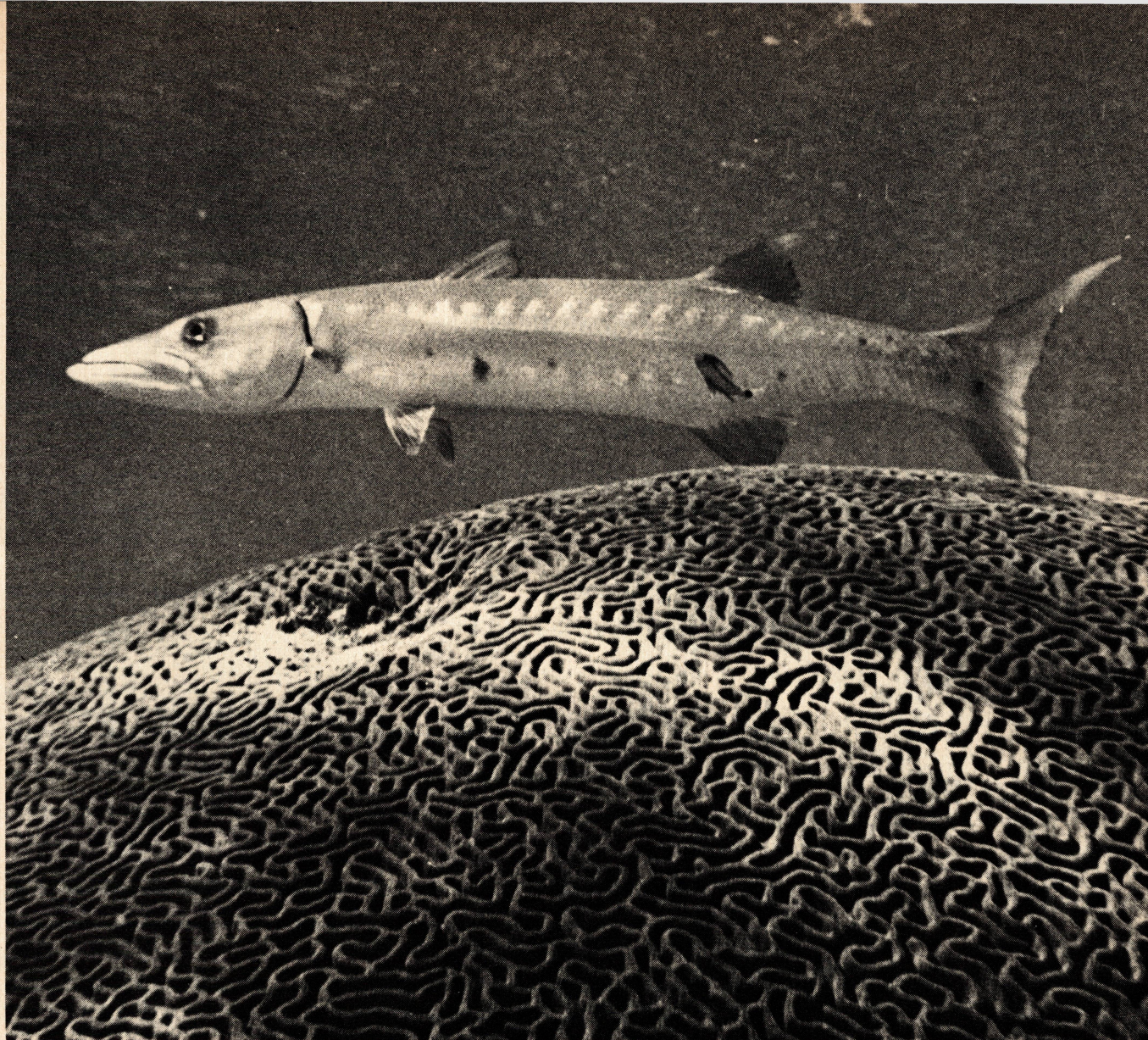
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# DIVERS BEWARE

## TAKE ACTION NOW!

At this very moment, state and local legislators are drafting, proposing, or have already passed laws in three different states to restrict your right to dive. It started in Los Angeles, and is spreading fast.

Some private interest groups, property owners and local politicians are also trying to close whole beaches and other dive sites for the sake of financial gain or personal animosity against divers.

A National Scuba Advisory Committee has been formed to fight this cancerous growth. The committee represents all citizen divers, certification agencies and manufacturers who want to preserve the sport from restriction and possible extinction.

**TAKE ACTION NOW!**

The committee is established and already fighting adversaries of our sport with facts, statistics and "legislative friends," but we need money. We cannot hope to succeed without support, even if it's only \$1.00.

National Scuba Advisory Committee  
P.O. Box 1120  
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Here is my contribution \_\_\_\_\_

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## SAN DIEGO U/W FILM FESTIVAL

BY CANDI CHRISTOPHERSON



photograph by Chuck Nicklin

The 11th annual San Diego Underwater Film Festival, for years a showcase for the best in underwater photography, has every indication this year of being bigger and better than ever. Presenting fresh and unusual films from around the world, the San Diego Underwater Photographic Society has for the past ten years excited diver and non-diver alike.

Last year the two-evening event was emceed by Ron and Valerie Taylor, internationally acclaimed underwater photographers in their own right. The dynamic Australian couple had recently filmed underwater sequences for the movie *Jaws*, and presented some spine-tingling footage of their own.

In addition to films, on exhibit will be prints and slides by San Diego UPS members. The Society, a non-profit organization, has as its major aim the fostering of quality underwater still and movie photography.

This year's emcee will be none other than the world famous Jean-Michel Cousteau. Well known for his work aboard the *Calypso* in addition to his excellent films and slides, Jean-Michel will be providing us with 15 minutes of exciting underwater footage.

Friday and Saturday evenings, September 12 and 13, at 8:00 p.m. the doors will open at the San Diego Civic Theater for this year's Festival. Presenting a different program each night, UPS is certain to offer something for everyone. Tickets are \$4.00 per show and may be purchased in advance by writing to: UPS Tickets, % Mark Hartsough, 7060 Beagle St., San Diego, Ca. 92110. Enclose a stamped return envelope.





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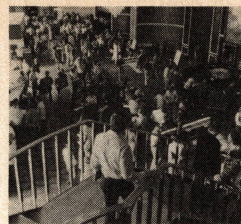
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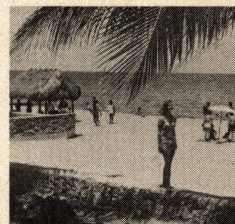
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August 1-2

1st Annual Palm Springs Gold Mining & Treasure Hunting Show, City Pavilion. (Contact: Show Director, P.O. Box 93, Duarte, CA 91010)

August 2-3

15th Top of Michigan Aqua Thon, Duncan Bay, Lake Huron, 10 a.m. (Contact: Dick Charboneau, R#2, Box 610-M33, Cheboygan, Mich. 49721)

August 8-10

19th Annual Southern Open Derby, Marathon, Fla. (Contact: Rusty Hoaglin, 2226 Terrace Dr. No., Clearwater, Fla.)

August 10-17

British Virgin Island Film Festival. (Contact: George Marler, Box 108, Road Town, Tortola, B.V.I.)

August 17

4th Film Festival, John G. Shedd Aquarium, 9 a.m.-5 p.m. (Contact: Peg Kern, Shedd Aquarium, 1200 South Lake Shore Dr., Chicago, IL 60605)

August 18

Seaspace '75 U/W Photo Competition entry deadline. (Contact: Renzo Vaccari, P.O. Box 387, Spring, Texas 77373)

September 1-7

2nd International Conference on Cave Diving & Rescue Work, Barcelona, Spain. (Contact: 2nd Int'l Conference on Cave Diving, Mauricio Serrahima 20, Barcelona, Spain)

September 13-14

Seaspace '75 Symposium, University of Houston, 9 a.m.-5 p.m.; film festival, Sat. 2:30 & 8 p.m., Jones Hall. (Contact: Bob Fowler, Kenlee's West, 5705 Glenmont, Houston, Texas; phone, 713-661-6080)

September 15

Entry deadline U/W freshwater photography contest, Chicago. (Contact: John G. Shedd Aquarium, 1200 South Lake Shore Dr., Chicago, IL 60605)

September 20

Underwater Film Review, John Hancock Hall, Berkeley St., Boston, MA, 8 p.m. (Contact: Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, MA 02117)

September 20

4th Inward to the Sea, George Washington Univ., Lisner Auditorium, Washington, D.C. (Contact: Inward to the Sea, P.O. Box 41010, Washington, D.C.)

September 26-28

NAUI 7th International Conference on Underwater Education, Miami, Fla. (Contact: NAUI Hdqrs., 22809 Barton Rd., Colton (Grand Terrace), Calif. 92324)

September 28-October 4

Bahamas Underwater Photo Treasure Hunt. (Contact: Kenneth Adderley, Ministry of Tourism, Box 3701, Nassau, Bahamas)

September 30-October 3

1st Annual Scubarama, Islamorada, Fla. (Contact: Holiday Isle Resort, P.O. Box 588, Islamorada, Fla. 33036)

October 1

13th Annual International Underwater Photo Competition. (Contact: Underwater Photographic Society, P.O. Box 7088, Van Nuys, CA 91409)

October 1-31

Advanced Methods in Underwater Research, USC Marine Science Center, Catalina Island. (Contact: Dr. Robert Given, USC Santa Catalina Marine Biological Lab, P.O. Box 398, Avalon, CA 90704)

October 3-4

Oct. 3, Freshwater Film Festival; Oct. 4, Chicago. (Contact: John G. Shedd Aquarium, 1200 South Lake Shore Dr., Chicago, IL 60605)

October 4-5

North Atlantic Underwater Convention, Rockport, Mass. (Contact: J. Burrage, 74 E. Main St., Hopkinton, Mass. 01748)

October 11

Seamark '75, New England Aquarium. (Contact: Phil Holt, P.O. Box 216, Gloucester, Mass. 01930)

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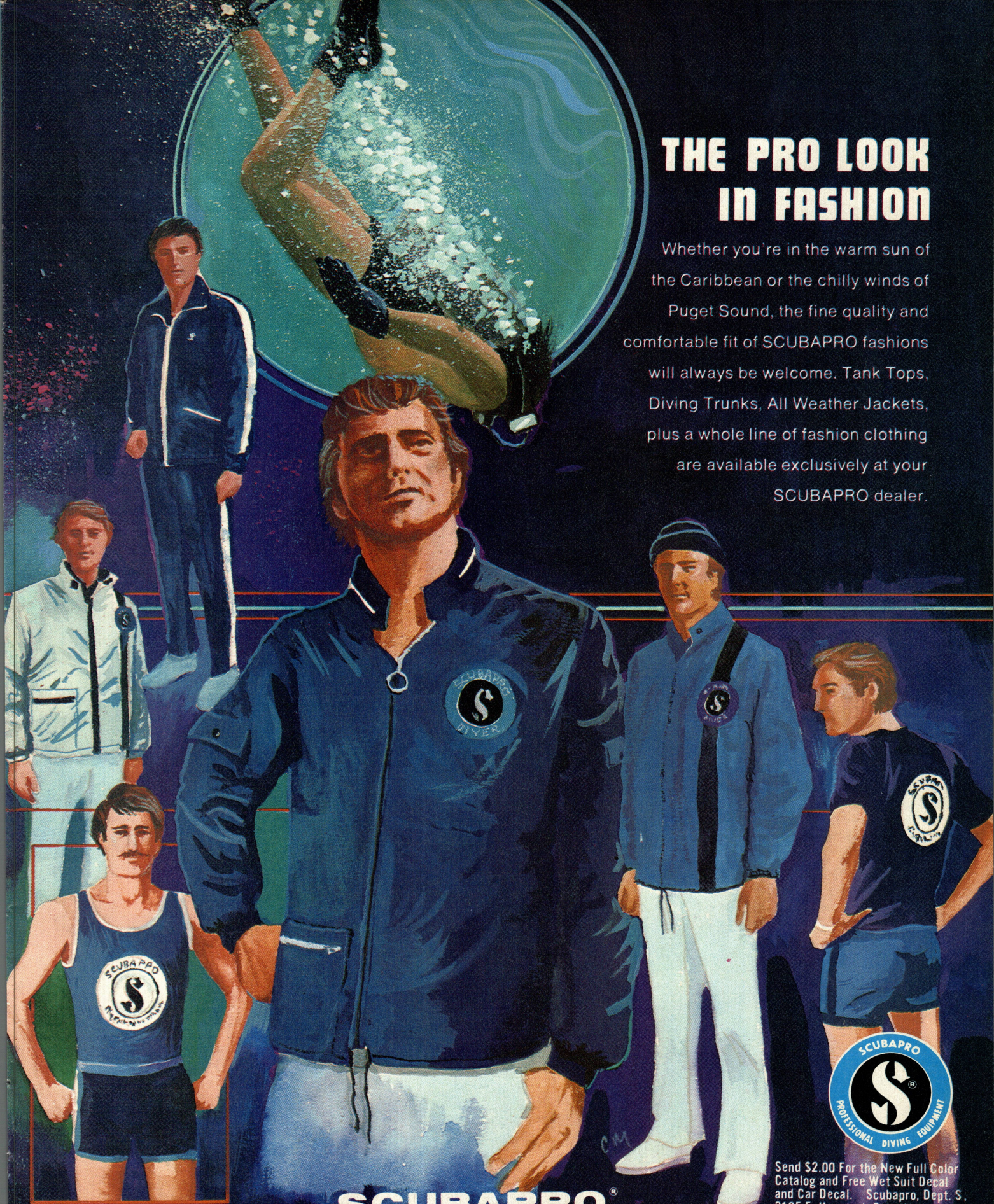
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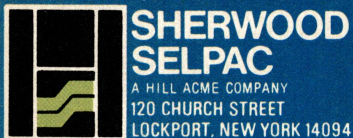
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# SDM'S National Scuba Exam

## What's your Diving Emergencies I.Q.?

Divers should be prepared to handle common and life-threatening emergencies which could occur while diving. This preparation includes training, emergency information and emergency equipment. Test your knowledge and preparation for Diving Emergencies by answering the following questions. For answers, turn to page 56.

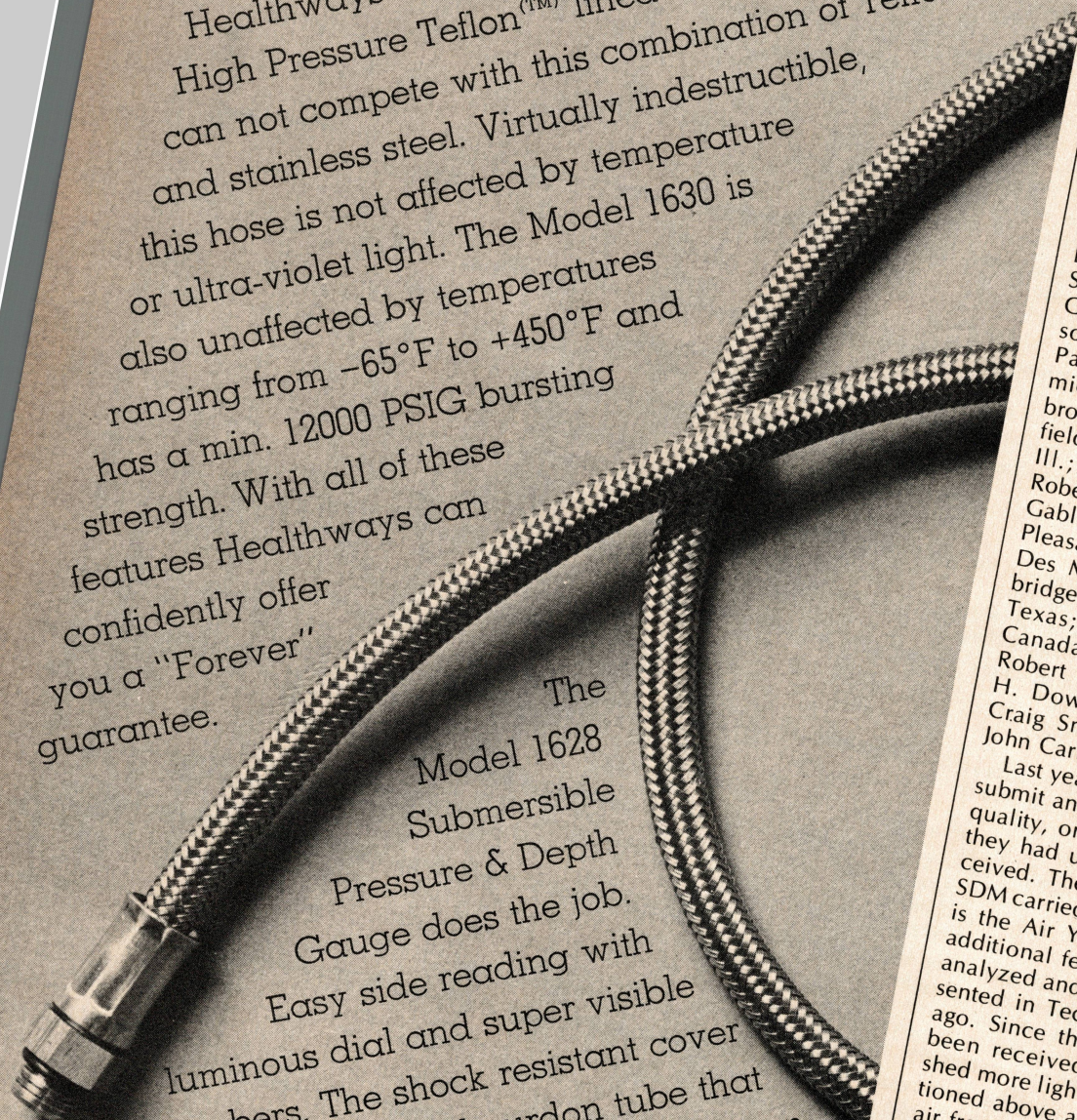
- 1) **Some items contained in some diving first aid kits are not standard items. Such items would include:**
  - ☐ A. Ammonia and alcohol.
  - ☐ B. Baking soda and meat tenderizer.
  - ☐ C. Hydrogen peroxide and epsom salts.
- 2) **The recommended procedure to use in most cases of bleeding is:**
  - ☐ A. Direct pressure.
  - ☐ B. Pressure on body pressure points.
  - ☐ C. A tourniquet.
- 3) **Upon reaching an unconscious, non-breathing diver at the surface in the water, your first action should be to:**
  - ☐ A. Signal for assistance.
  - ☐ B. Tow the diver to boat or shore.
  - ☐ C. Begin resuscitation.
- 4) **First aid for drowning includes:**
  - ☐ A. Draining all the water from the lungs.
  - ☐ B. Making certain the person receives medical attention.
  - ☐ C. Notifying the nearest relative.
- 5) **A diver has been rescued, resuscitated, removed from the water and has regained consciousness. You should now:**
  - ☐ A. Recover any lost equipment.
  - ☐ B. Account for the diver's buddy.
  - ☐ C. Write down all details of the incident.
- 6) **If an unconscious, non-breathing person should vomit during resuscitation, you should:**
  - ☐ A. Cease resuscitation.
  - ☐ B. Roll the person over, clear away all vomitus and continue resuscitation.
  - ☐ C. Turn the victim's head to one side, allow the vomitus to drain and continue resuscitation.
- 7) **Cold and clammy skin, a pale face, nausea or vomiting, and shallow breathing are signs of:**
  - ☐ A. Hypothermia.
  - ☐ B. Heat stroke.
  - ☐ C. Shock.
- 8) **An important consideration in the treatment of shock is:**
  - ☐ A. Cooling body temperature.
  - ☐ B. Maintaining body temperature.
  - ☐ C. Increasing body temperature.
- 9) **The preferred location to check the pulse on a diver is the:**
  - ☐ A. Inside of the wrist.
  - ☐ B. Inside of the bicep.
  - ☐ C. Side of the neck.
- 10) **If a serious accident occurs while diving from a boat, you should, if possible:**
  - ☐ A. Contact the Coast Guard.
  - ☐ B. Hoist the "Distress" flag.
  - ☐ C. Get underway for the nearest landing.
- 11) **Administering oxygen to victims of serious diving accidents is beneficial because it:**
  - ☐ A. Can reduce circulatory obstructions.
  - ☐ B. Is purer than the surrounding air.
  - ☐ C. Will not enter the blood stream as bubbles.
- 12) **A diver complains of pain in the shoulder after several dives and plans to descend again until the pain is relieved and then to decompress. You should:**
  - ☐ A. Assist with extra tanks and equipment.
  - ☐ B. Recommend against the procedure.
  - ☐ C. Calculate the required decompression to confirm the person's calculations.
- 13) **A diver exits the water, removes equipment and loses consciousness. After checking pulse, respiration and treating for shock, you should:**
  - ☐ A. Transport the diver to the nearest recompression facility.
  - ☐ B. Administer fluids.
  - ☐ C. Monitor the person closely until consciousness is regained.
- 14) **If in water too deep to stand and you suspect a diver's heart has stopped beating, you should:**
  - ☐ A. Immediately begin cardio-pulmonary resuscitation.
  - ☐ B. Immediately begin resuscitation.
  - ☐ C. Tow the diver to shore or boat.
- 15) **An injured diver should be placed in which of the following positions:**
  - ☐ A. Flat, on the left side.
  - ☐ B. On the back, with the feet elevated.
  - ☐ C. On the left side, with the hips higher than the shoulders.



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## Technifacts from a Master Diver

BY E. R. CROSS

The basic purpose of this column is to stimulate an interest in the technical aspects of diving and will be devoted to providing factual answers to questions from SKIN DIVER readers. Answers will be designed to apply to the majority of diving situations, problems and equipment in use today. Single subject questions are best suited to Technifacts and may be on any subject related to diving. Watch for your answers in Technifacts.

For their questions or comments used in this month's Technifacts I would like to thank Bee McCarthey, Arvada, Colo.; David Andrews, Nassau, Bahamas; John Schmied, Alameda, Ca.; Jan Stevenson, Lubbock, Texas; Mark D. Johnson, Moorehead, Minn.; Mike Smith, Pasadena, Ca.; John Dombek, Carbrook, N.Y.; Harold J. Lambert, Stonyfield, Mich.; Guy Almerico, Elmhurst, Ill.; Bruce Hopkins, Rock Ford, Ill.; Robert Holzer, Los Angeles, Ca.; Gene Gable, Alhambra, Ca.; Bruce Lannam, Pleasant Hill, Ca.; Mike Dunley, West Des Moines, Iowa; Gary Keller, Bainbridge, Ga.; D. D. Freeman, Garland, Texas; Robert Weisbloom, Montreal, Canada; R. P. Cross, El Paso, Texas; Robert Leschinski, Skowhegan, Maine; H. Dowsell, Bondi, NSW, Australia; Craig Smith, San Francisco, Ca.; John Carry, Los Angeles, Ca.

Last year Technifacts asked readers to submit any information they had on the quality, or lack of quality, of scuba air they had used. Several letters were received. The September, 1974, issue of SDM carried an article titled, "How Pure is the Air You Breathe?" This sparked additional feedback. These letters were analyzed and a brief follow up was presented in Technifacts of a few months ago. Since then more information has been received, some of which might shed more light on both the article mentioned above and on divers getting bad air from dive shops.

First, referring to the article, "How Pure is the Air You Breathe" (Leo G. Belarts, Jr., SDM for Sept., 1974), one reader wanted to know the source of such contaminants as nitrogen dioxide, nitrous oxide, and sulfur dioxide. There are two theoretical sources for nitrogen dioxide ( $\text{NO}_2$ ) in a diver's air supply. One source is from the gas generated by high temperature combustion and other industrial operations that eventually finds its way, via the atmosphere,



into the diver's tank. The other source for NO<sub>2</sub> is from within the air compressor. Nitrogen dioxide is formed as a direct union of nitric oxide and oxygen. Nitric oxide may be formed directly from its elements (nitrogen and oxygen) by the action of either electric sparks or high temperature. In the case of an air compressor it would have to be as a result of heat. However, the temperature that must be reached for the combination of nitric oxide and oxygen to take place to form nitrogen dioxide is quite high and not likely to be reached in an air compressor used for filling diver's tanks. However, the facts do remain; nitrogen dioxide can form and it is irritating in very low concentrations.

Traces of the second contaminant, nitrous oxide, might possibly be found in the atmosphere although this is unlikely. Also it is unlikely that nitrous oxide could be formed within the air compressor filling diver's tanks since it can be synthesized from its elements only with difficulty and under special circumstances.

The same reader wanted to know what the strong odor of nitrogen dioxide (mentioned by the author of "How Pure is the Air You Breathe") was like. I have been unable to find a description of the odor of nitrogen dioxide. Perhaps a Technifacts reader can help on this. On the other hand, nitrous oxide does have a distinct, easily detected odor that is described as pleasantly sweet to both taste and smell.

The principle source of the contaminant sulfur dioxide is from the burning of sulfur bearing materials such as coke, natural gas, and petroleum products. It would most likely be in the form of air pollution which might eventually reach the diver's air through the compressor.

Another reader, writing about the same article, wanted information about the air compressors listed. He stated, in part, "The article, How Pure is the Air You Breathe had pictures and a small amount of information describing 20 different air compressors, some of which appeared to be the same compressor system (i.e., Bauer compressor) with different motors and possibly different rpm's to get the various cubic foot capacities. The Mako Purus compressor unit was originally made by Bauer to deliver 0.9 cubic feet of air per minute. Mako increased the rpm on their Purus to deliver 2.6 cfm, while U.S. Divers rates theirs at 2.1 cfm. I wonder if Innerspace's, the Poseidon, and Dacor units rated at about 3.0 cfm are the same compressor unit operated at an even faster rpm. Also, wouldn't operating a compressor designed for delivering about 0.9 cfm at an rpm to produce more than twice that amount of air cause trouble?"

A compilation of the limited data provided about the air compressors listed in the previously mentioned article and an examination of the illustrations leads me to believe that the air compressors used are not all the same unit. Possibly the



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# The Tougher Banditos

**Technifacts**  
from a Master Diver

Mako and the U.S. Divers unit are using the same Bauer compressor with different power sources. Both units are the same dimensions, the same working pressure, and, nearly, the same cfm output. However, the weight of the units are quite different as are the prices. This could possibly be due to added engine power to make it possible for the Mako to deliver slightly (one-fifth) more air than the U.S. Divers unit.

It seems more likely that Innerspace, Dacor, and the Poseidon units all use different size air compressor units. Dimensions of the units, weights, and price of units are different.

While it is not good policy to operate any machine faster than designed speed (rpm) it would not necessarily damage the air compressor to operate it at an rpm that would deliver a higher cfm. Provided, and this is important, the designed working pressure of the unit was not exceeded. And provided further that the proper cooling and proper maintenance (lubrication, filtering, etc.) procedures were followed. The overall life of the unit would, of course, be shortened as wear on the unit would be accelerated by the increase in rpm's. As an example, suppose the designed life of an air compressor was to deliver 10,000 cubic feet of air at a pressure of 2500 psi. If the normal operating rpm delivered 1.0 cfm a total of 10,000 minutes of operating time would pass before the unit required overhaul. If the same compressor was operated at twice the normal speed, and if all other factors of pressure, cooling, and maintenance, were met, the 10,000 cubic feet of air would be compressed in half the time or in 5000 minutes and the air compressor would then require overhaul. This is only an example as different air compressors are designed to deliver different volumes in their useful lives.

Several more Technifacts readers wrote about their experiences with bad air from scuba supply shops. Three of these are discussed briefly primarily to make divers aware that some diving conditions might cause symptoms that might not be related to bad air while in other cases bad air was definitely a factor in the distress of the divers.

One reader wrote, "On the day of the diving the two buddy pairs split up. Neither team went below 25 feet. The average depth was about 20 feet. Total bottom time for one team was 45 minutes; 58 minutes for the other team. No unusual physical or mental signs were noted by any of the four divers during the dives. At the end of the dive we assem-

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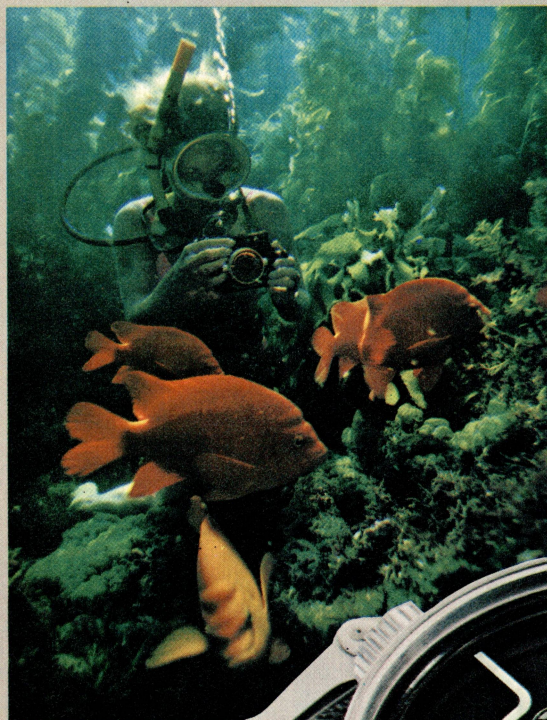


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


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## NIKONOS II THE AMPHIBIOUS 35





# Technifacts from a Master Diver

bled at the beach to relate our experiences. We found that each of us now had a strange feeling in our chests. I felt that I could not breathe normally. Whenever my buddy or I tried to take a deep breath, we found we could not hold our breaths but had to exhale. This was followed by a fit of intense coughing. With light breathing we were o.k. We were the team that had been down for 58 minutes. The other team that had dived only 45 minutes did not experience nearly so much difficulty. What do you think caused this?"

The cause of the post-dive distress could, of course, have been some form of bad air. While a number of questions remain unanswered in this case, I would be more suspect of respiratory fatigue and, possibly, respiratory dehydration. Since the symptoms disappears completely without treatment after a relatively short time and the fact that there was no other physiological indications of contaminated air, the later seems more likely. Also the fact that the refill the shop gave you caused no ill effects further substantiates respiratory fatigue and/or

respiratory dehydration. It would be interesting to know the background of the dive made on the refill — depth, duration, amount and duration of work. In other words, how deep did you go for how long and how much respiratory effort was made as compared with the first dive that caused the trouble. Respiratory fatigue and respiratory dehydration can cause problems.

Another reader stated, in part, "In mid-May we went diving with a dive guide for two days. We had made advance reservations by mail. The second day my husband and I both noticed a distinct taste of oil in our first tank of air. In my case it caused a dull headache after we ascended and were on our way to a second dive spot. My husband had no aftereffects. . . Our second tank of air that day was o.k."

All too often there is an oily taste (and smell, too, if you take the time to sniff the air before the dive) in air from oil lubricated compressors. It is the direct results of poor air compressor operating procedures at the time that particular tank was filled, or when a particular group of tanks were filled. If an air compressor is operated just a little too long, or allowed to get slightly hotter than it should, oil fumes from the lubricating oil can seep past rings and valves into the compressor side of the pistons and into the diver's tank. Another tank, or group of tanks filled a short time later when the compres-

sor is cooler and there will be no odor or taste of oil.

A third reader got an air fill that could have resulted in disaster. He stated, in part, "Several of us had had our tanks filled here in the past with no problem. But on one occasion we had a serious problem. We had our tanks filled enroute to some shallow cave diving, I was with one other diver on the first descent. I first detected my problem when at a depth of about 35 feet and about 40 feet back into the cave. My vision had narrowed and was hazy and I was dopey. Also I was developing a headache. My mental functions had already deteriorated to such an extent that I did not consider myself in trouble and did not signal my partner nor start for the surface. Then my partner, who was ahead of me, entered a chamber slightly wider than the neck of the cave I was still in. He turned around facing me and pointed to his tank and signaled me to start back. By now my own condition was so bad I simply tried to back out of the narrow part of the cave and made no effort to find out if my buddy needed air or what. By now my limbs were beginning to tremble. Finally my partner got me turned around and headed for the opening and the surface. As we ascended my head cleared and I realized the seriousness of our situation."

This Technifacts reader continued, "Our friends on the surface helped us out of the water. The highway patrol was

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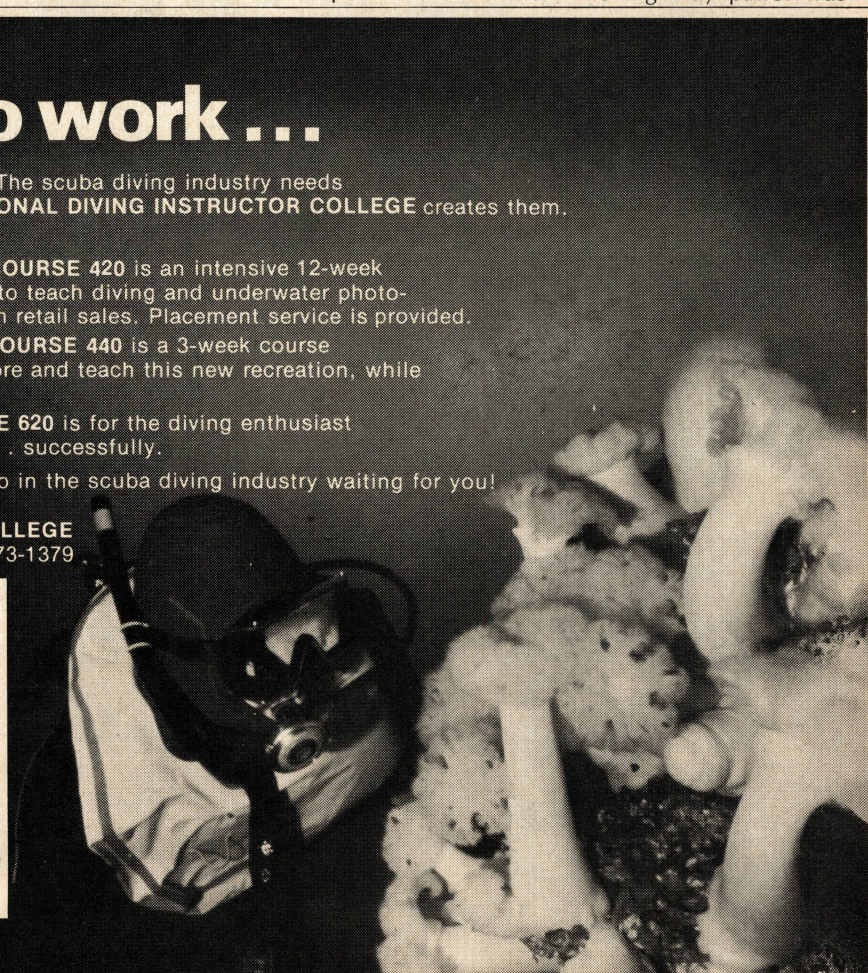
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## Technifacts from a Master Diver

contacted and we got directions to a clinic where oxygen was administered to us. A day later we returned to talk to the man who had filled our tanks. We found he was using a gasoline driven unit and it was no surprise to us to see the engine fumes rise to the low roof of the protective shed, flow to the opposite end of the shed, and then, cooled, descend and flow, nearly full strength, across the compressor intake and into the tanks."

These divers suffered near fatal symptoms of carbon monoxide poisoning. The source of the CO in this case was from the exhaust of the gasoline engine that was driving the air compressor. Another possible source of CO is from incomplete combustion of lubricating oil in an improperly operated and/or maintained air compressor, whether gasoline or electric motor powered. This incomplete combustion within the compressor is known as dieselizing and can occur as a result of the use of improper lubricating oil; i.e., a lubricating oil having too low a flash point (the temperature at which the oil burns incompletely to produce CO) in the compressor. Sometimes, with improper operation, even a recommended, high flash point oil can be heated to the point of incomplete combustion.

The three letters just discussed are representative of the three degrees of reported bad air. The first case is one in which the diver feels his air was bad but that could turn out to be simply respiratory problems. Usually this type trouble is not noted while the diver is in the water. When it is, the condition sometimes leads to even more serious problems as a result of psychological reactions on the part of the diver. This usually takes the form of additional effort to reach safety with additional fatigue/dryness and finally panic and exhaustion. If respiratory fatigue is noted the diver should relax, rest, breathe calmly, and try to moisten his mouth and throat by admitting wetness (not a lot of water) around the mouthpiece of the scuba. Be sure your buddy diver is aware that you are having trouble and that you might require aid to reach shore or the diving platform.

The second situation in which the diver detected an oily taste in his air supply is all too typical. If the air is truly pure, there should be no taste or smell at all when diving to normal diving depths. (At a depth beyond about 250 feet, air takes on a slightly metallic taste that is believed to be due to the increased nitrogen density.) For most divers the sense of smell will detect even slight traces of oil in the compressed air. When you pick up



your tanks cup one hand around the valve orifice. Very carefully and slowly barely open the valve allowing a small amount of air to flow into your cupped hand. Now sniff this escaping air for signs of distinctive oily smell. Even harmless amounts of oil vapors can be detected. Occasionally a totally unscrupulous dive shop operator will add oil of wintergreen, or other additive, to the filter of an air compressor, to mask the odor of oil vapors that might be in the breathing air. When such an odor is detected, do not use the air.

The third situation could also have been detected by the divers had they sniffed the air from their tanks prior to use. Mixed with the CO from the gasoline engine would have been particles of smoke and oily fumes. A careful sniff would have made the divers aware that the air was bad. CO from dieselizing might be more difficult to detect from odor and would not be possible unless the compressor was in bad condition.

*Diver Propulsion Units* — Since publication of Technifacts advising readers of the Popular Mechanics article on constructing an electric DPV (diver propulsion vehicle) a number of additional letters have been received. Three of these letters had additional information which is condensed in this month's Technifacts.

One Technifacts reader wrote, "I secured plans from Popular Mechanics and built one (a DPV) in my spare time at a cost of about \$150.00. I have been highly pleased with the performance of the unit. Features which make this unit desirable are low cost construction, four separate ballast compartments, two propulsion motors, streamlined delta wing design, and the high performance battery. Plans leave no problem with construction and securing parts and materials were no problem."

Another reader wrote, "I put one of the units together and feel it is a worthwhile project at a cost of \$138.00."

As mentioned previously, plans for the DPV can be obtained from Popular Mechanics, Dept. ST., Box 1014, Radio City, N.Y. 10019. Cost for complete set of plans is \$7.95. I was so impressed with the enthusiasm readers had for the unit I found a back issue of the magazine and read the article. The designer of the DPV, Kent Markham, Greenridge Rd, Jacksonville, Fla. also designed and built one and two man subs. The articles describing these were published in Popular Mechanics for June, 1971 (for the two-man job) and June 1968 (for the one-man unit). Readers might find back issues in their library.

According to two Technifacts readers, hydrogen absorbers can be obtained from Hydro-Catylator Corp., P.O. Box 3648, Hiialeah, Florida 33013.

A half dozen other readers wrote and still need information on the construction of dry type subs. Are there plans and parts available for such units?

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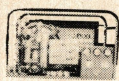
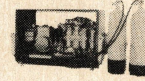
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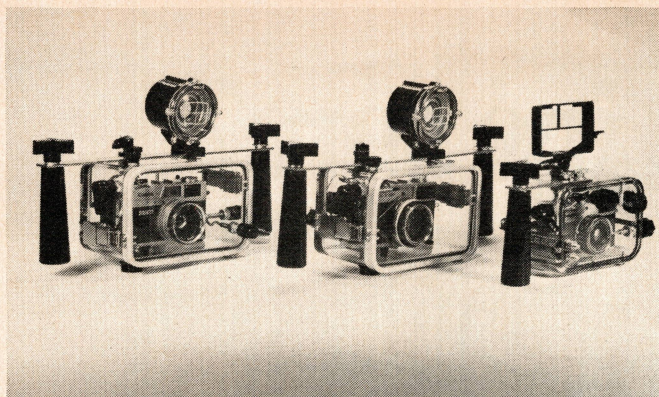
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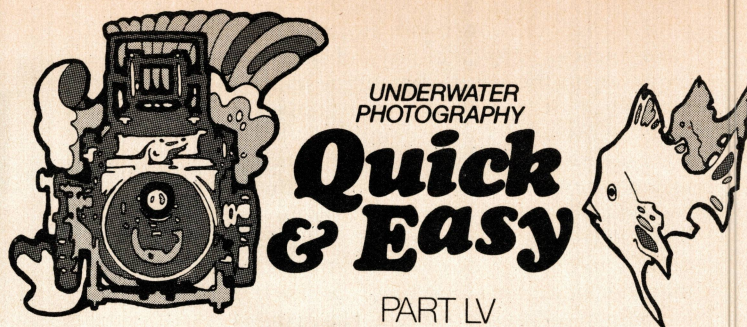
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Cameras listed from left to right: Canon G-III with Ikelite #5617 housing and #5002 Optical Viewfinder; Olympus-35 SP with Ikelite #5635 housing and Optical Viewfinder; Olympus 35RC, Ikelite #5385 housing, #5001 Sportsfinder.



## AUTOMATIC EXPOSURE CONTROLS with RANGEFINDER CAMERAS

By Jim and Cathy Church

Several readers have asked us about using automatic exposure controls for available light U/W photography. They usually have two questions: First, will a built-in exposure system function underwater? Second, can the exposure indicator in the camera viewfinder be seen when the camera is housed and the photographer is wearing a facemask? In addition, those with rangefinder cameras usually ask if the rangefinder can be used effectively underwater. These are the questions which we shall attempt to answer with this article.

**Built-in Controls** — The heart of any automatic exposure system for available light photography is an exposure meter built into the camera. We classify these systems as being either semi or fully automatic. With a semi-automatic system, a needle in the viewfinder must be aligned with a reference mark by moving the shutter speed or aperture control. In other words, the photographer must still do something to set the camera for exposure. With a fully-automatic system, the exposure is set automatically when the camera is aimed at the subject. Sometimes the photographer must depress the shutter release halfway to activate the system, but this is easy to do. Many fully-automatic systems have an added safety feature: the system locks the shutter release if there is not enough light for an exposure. Fully-automatic systems are great for the U/W photographer who doesn't want the bother of handling a separate exposure meter or making exposure adjustments when he is composing a picture.

**Testing** — Because we wished to test rangefinders as well as automatic exposure control systems, we selected three popular 35mm cameras which offered both of these features. These cameras were the Olympus 35 RC, Olympus-35 SP and Canon G-III QL. The cameras, complete with U/W housings and accessory optical viewfinders, were loaned to us by Ike Brigham of Ikelite Underwater Systems.

After making actual exposures with each of the test cameras, our basic results were as follows: (1) All of the test exposures were pleasing. (2) The entire area of the viewing screen can't be seen at any one time, but any part of the screen could be seen if we shifted the position of our eye. (3) The exposure indicators within the viewers were bright enough to be read underwater. (4) The small area of the rangefinder — where the two images merge when focus is correct — is best seen in clear, bright water with a stationary subject. A more detailed set of conclusions will follow the discussion of the individual test cameras and housings.

**Olympus 35 RC** — The little 35 RC is a surprising camera for its small size. It has shutter speeds from B to 1/500 second, apertures from f2.8 to f22, built-in rangefinder and fully au-

tomatic exposure control for ASA ratings from ASA 25 to 800 (din from 15 to 30). The corresponding Ikelite #5385 housing is also an interesting little package with a single plastic handle and controls for film advance, shutter release, shutter speed, and aperture. The automatic system can be overridden by manual control. A groove at the upper rear of the housing accepts Ikelite or other sportsfinders with Nikonos-type mounting shoes. The camera/housing combination handled well underwater. The shutter speed is preset manually, and the automatically selected f-stop can be read by looking slightly downward to the scale in the camera viewer.

**Olympus-35 SP** — With the 35 SP, both the shutter speed and f-stop are automatically set when the camera is in the automatic mode. It has shutter speeds from B to 1/500 second, apertures from f1.7 to f16 and can be used in automatic with ASA ratings from ASA 25 to 800.

The Ikelite #5635 housing has twin plastic handles and is both light and reasonably compact. The handles, as well as those of other Ikelite housings, can be removed for packing. The Ikelite #5002 optical viewfinder attaches to the top of the housing and is a marked improvement over the simpler Nikonos-type sportsfinder. This viewfinder gives excellent results when it is held about three inches from the faceplate of your diving mask. The picture area within the optical viewfinder can be emphasized even more by masking the outer border of the picture area with black electrical tape. The housing has controls for shutter release, film advance and focus. No control is provided for exposure as both the aperture and shutter speed are fully automatic.

Underwater, the exposure scale and needle can be seen by looking upward into the camera viewer. This scale is expressed in EV numbers (an exposure value system which uses a single number rather than separate numbers for aperture and shutter speed). When the needle moves into the yellow zone, the exposure will be made with a shutter speed of 1/30 or 1/15 second, so the camera must be braced or held firmly. If you are not accustomed to working with EV numbers, the values in terms of f-stops and shutter speeds are included in the owner's manual and can be written on masking tape stuck to the rear of the camera's housing.

**Canon G-III QL** — The QL has apertures from f1.7 to f16, shutter speeds from B to 1/500 second and fully automatic exposure control for ASA ratings from ASA 25 to 800. The shutter speed is preset, and the aperture is determined automatically and is indicated on a scale at the right side of the camera viewer screen. Underwater, it can be seen when the eye is directed to the right of the screen. The Ikelite #5617



housing is similar in size and shape to the housing discussed above. It has twin handles and controls for shutter release, film advance, focus and aperture. The automatic control can be overridden. The camera/housing combination is comfortable to handle underwater.

**Conclusions** — Our conclusions, based on the three camera/housing combinations tested, are as follows:

Read the instructions for both the camera and housing carefully — especially the directions for placing the camera within the housing and sealing the port. With the Olympus 35 RC and #5385 housing, practice closing the housing several times. Be careful — it is tricky to seal and close properly! With the housings for the Olympus-35 SP and Canon G-III QL, visually examine the O-ring before clamping the quick-release snaps in place. If the O-ring is bulged outward toward the outer edges of the sealing area, gently push it back into place. An ice cream stick is a good tool. The focus control for the Olympus-35 SP uses a belt drive, with an O-ring for the belt. By putting the O-ring on in a figure-eight manner, all slippage was eliminated.

Be sure that the optical viewfinder is attached to the camera in correct alignment. The parallax adjustment is particularly important. Be sure that the locking nut is securely tightened and recheck the parallax adjustment when underwater. It can slip and cause you to misframe your pictures.

Upon entering the water, inspect any camera housing for leaks. Look for small droplets of water clinging to the inside. If you don't look carefully, these droplets could appear to be air bubbles adhering to the outside of the housing. As standard procedure with any housing, we tape a small bag of silica gel to a lower corner inside the housing. This eliminates condensation and will help trap and localize any small amounts of water which may leak into the housing.

Aim the camera with the optical viewfinder attached to the housing. We've tried both — the camera viewfinder and the accessory optical viewfinder — and prefer the latter. The rangefinder can be used to focus for stationary subjects in bright conditions, but underwater subjects are often moving in dim light. We suggest using the rangefinder to zone focus for a predetermined distance, say for about three feet, and

then not attempt to refocus for other shots at the same approximate distance used before.

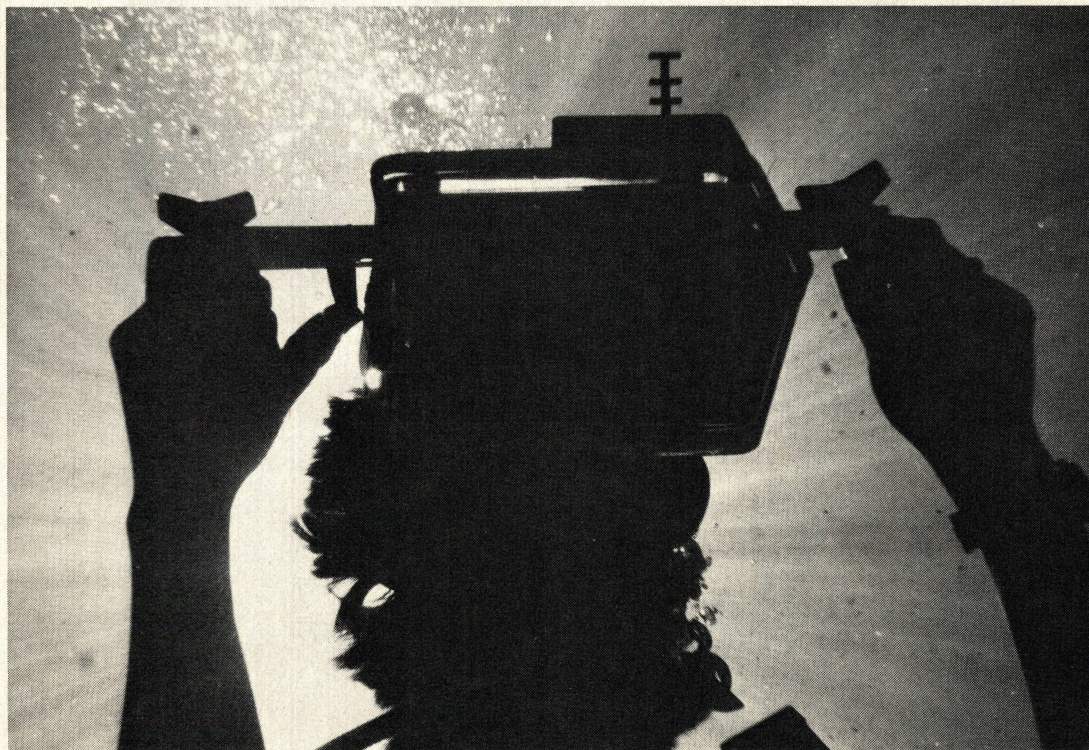
It isn't always necessary to observe the indicated exposure in the viewfinder of the camera with a fully-automatic system. If there is enough light for an exposure, the shutter will operate when you press the shutter release control. If not, the shutter will not operate. The important point is not to use excessive force on the shutter release control. You could possibly bend the control rod or damage the camera. Develop a light touch.

You may wish to override the automatic exposure control with the Olympus 35 RC or Canon G-III QL. You can note the automatically determined f-stop on the exposure scale in the viewfinder, and then adjust manually to a higher- or lower-numbered stop for the exposure. For example, when inside a cave and photographing against a bright opening, you may wish to overexpose for the opening to gain more detail with darker subject areas such as a diver or fish within the cave. Remember that the automatic control will react to the large, bright opening rather than to smaller, darker subjects. Likewise, you may wish to underexpose the darker areas if well-defined silhouettes are desired.

**Adding Flash** — Because each of the test cameras has a front shutter (iris or leaf) and is preset for "x" synchronization, flashbulbs may not synchronize at shutter speeds faster than 1/30 second. Strobes, however, will synchronize with these cameras at all shutter speeds and adds an interesting possibility for strobe fill lighting. A small strobe (ASA guide number of 25 or 30) could be used for fill when the camera is set for automatic exposure control with available light. In reasonably clear water, the available light would overpower the strobe at distances of about three apparent feet or more. Thus, the advantages of strobe fill are gained, but without the need to make exposure calculations or manual exposure settings.

**Other Cameras** — In addition to the three cameras tested specifically for this article, we have used several other cameras with automatic exposure controls in the past. Some of these cameras are the Cannon F-1, Kodak X-45 Instamatic, Nikon Super-8 movie camera, and both the Kodak XL 33 and XL 55 movie cameras. In each case, the automatic exposure control provided pleasing exposures. ➤

photography by Authors



The above is an upward silhouette taken with an Olympus 35 RC with automatic exposure control.





# COMBAT CAMERA

The Navy's Eyes Under The Sea

photograph by Ken Hess



## By Ellsworth Boyd

**M**ost people like to save the best till last, like the olive in a martini, dessert after the main course, or a snack at bedtime. For me, diving with the underwater team of the U.S. Navy's Atlantic Fleet Combat Camera Group was a subsea smorgasbord, serving the best from beginning to end.

As an aperitif we dived the shallow waters of Trumpet Reef, baring majestic formations of elkhorn coral unequaled in size and beauty. For hors d'oeuvres I had my choice of two enticing shipwrecks. Gluttonous guest that I am, I chose them both! The main dish was a 180-foot dive on the illustrious Andros Wall, while dessert consisted of a ride on the diver support vehicle, *Pegasus*. The midnight snack was just that — a night dive on one of the wrecks where gregarious groupers, trained to eat from your hand, swarm in for freebies. Like us, they enjoy a snack before bedtime, too!

The chef of this extraordinary Bahamian smorgasbord was Chief Richard Johnson, connoisseur of the best in underwater treats. Diving with him and the men of the Atlantic Fleet Combat Camera Group was like dying and going to heaven!

If I were a few years younger, recruiters would have little difficulty signing me up. Where else, except in heaven, can you do what your heart desires? In this case it's a full-time occupation of diving and photography, with good pay and fringe benefits. Few people realize that the Navy has a worldwide Combat Camera Group, including a specialized team of underwater photographers.

Naval combat photography goes back to the Civil War when Mathew Brady, standing on the deck of the *Monitor*, photographed one of the most celebrated battles at sea — the famous *Monitor-Merimack* skirmish. During World War II the Navy commissioned four-man crews to document Navy and Marine Corps action in both the Atlantic and Pacific theatres of war. Reactivated for Korea and Vietnam, the Combat Camera Teams went into action again, expanding their role to reconnaissance, surveillance and intelligence operations, as well as historical and public information coverage.

Today the group covers millions of square miles, from the Mississippi River to the Indian Ocean and from the North Pole to the South Pole. But contrary to their "Combat Camera" name, soon to be called Atlantic Fleet Audio-Visual Command, these Navy men are not engaged in assignments involving conflict. Motion picture crews and photojournalists cover space launchings, astronaut recoveries, presidential visits, fleet exercises, research projects and other assignments indicative of the peace-keeping Navy.

In addition, there's an elite group that works in a totally different environment. They are the photographers who man the Navy's basic school of observation — its "eyes under the sea." A specialized unit, they are some of the best trained, best equipped underwater cameramen in the world. These men combine the professional skills of still and motion picture photography with special techniques for U/W coverage.

"Action ready — anytime, anywhere," is one of their mottos and AFCCG's diving team remains on call for any assignment that needs man and camera under the sea. They photograph U/W habitats, submersibles, marine life, ordnance disposal, ship salvage and varied oceanographic projects and studies.

Research and development are two of this unit's major objectives. New men and new equipment must be tested, therefore the team leaves its home base, Norfolk, Virginia, in the middle of winter and heads for sunny Andros in the Bahamas. This four-week test and evaluation assignment is a yearly trek and needless to say, one the men savor. They schedule two dives a day, everyday for one month.

Last January, eight men and 5000 pounds of equipment, packed into a Lockheed C-130, landed at Andros Town. It took



photograph by Mac McCraw



photograph by Steve Waterman

Naval photography goes back to the Civil War. During World War II the Navy commissioned four-man crews to document Navy and Marine action in both the Atlantic and Pacific. Reactivated for Korea and Vietnam, the Combat Camera Teams went into action, expanding their roll to reconnaissance, surveillance and intelligence operations.







photograph by Steve Waterman

*A test and evaluation of new men and equipment takes the team to the Bahamas. Above, a grouper swims through a wreck.*

them just one day to establish a beachhead in a building a stone's throw from the water's edge and five minutes from the nearest reef. AFCCG's diving team took Andros like Sitting Bull took Custer, only their warpath was the deep-sea terrain of the third largest barrier reef in the world. They shot everything in sight, including me, which was definitely a big mistake to begin with.

"We plan our dive, Boyd," the Chief explained, "well in advance. This afternoon we plan to put you down on a shipwreck and take some pictures of you feeding the fish."

The midday sun blazed down on a flat, calm sea whose dark parallel reef line ran as far as the eye could see. The Chief at the helm, our 20-foot Zodiak with a 40 h.p. outboard took off, hell-bent for Goat Cay. The diver back-up boat, a smaller Zodiak with a 20 h.p. motor, plodded behind in our wake, PH1/DV Eugene "Mac" McCraw in command. Divers in both boats maintain contact with each other and the Andros base through citizen's band walkie-talkies. We had close to 2000 pounds of men and equipment in our boat alone, including over \$50,000 worth of camera gear nestled snugly in a waterproof plastic instrument case that looked to me like a giant beer cooler.

The Andros reefs are like the Chief's backyard. He's been diving them for over ten years. Triangulating Goat Cay with two towers on shore, he dropped the anchor right on target. The back-up boat caught up and anchored into the wreck 70 feet below.

Buddying with PH1/DV Steve Waterman, McCraw took a

Nikonos from the instrument case. Waterman chose the underwater Leica, a fixed focus prototype test camera. PH1/DV Dave Graver used a Nikon-F in an Oceaneye housing. His buddy, PH3/DV Ike Johnson chose the Hasselblad. PHAN/DV Ken Hess took a 16 mm movie camera — the Rebikoff-Milliken DBM-5, while PH1 Bob "Woody" Woods worked with another Leica. Woods, a photo-journalist based in Norfolk, accompanied the team to write a story for a fleet publication. The Chief manned a Milliken-DBM-9-1, another 16 mm movie camera. Each diver carried a Sekonic light meter. Good at all light levels, the compact Sekonic accommodates both still and motion picture cameras. PH1/DV Dave Harris, the topside supervisor, remained in the boat.

"You're center-stage, Boyd," the Chief reminded. "Don't disappoint us." The rest of the men were waiting on the bottom. He thrust a can into my hands and commanded, "Feed the fish these goodies. I'm going down 20 feet with the DBM-9. Do a back-roll-out and kick to the bottom. I'll get it on film."

I couldn't believe it. I had seven of the best underwater photographers in the whole U.S. Navy waiting to take my picture! Fleeting, I envisioned myself as Jacques Cousteau, Lloyd Bridges and James Bond, all rolled into one. Majestically I would glide into the focal plane of the camera, unfurling graceful flutter kicks and fluid downward movements. But my fantasy faded when Harris broke the silence with, "Boyd, your mask is upside down. You better fix it or you'll be trying to clear your eyeballs!" His words fell upon deaf ears.

I rolled backward out of the boat, flooded my mask, dropped



my weight belt and bobbed to the surface. The Chief gave me a Jack Benny gesture underwater. With palm on cheek, he shook his head in disbelief. Finally I got straightened out and settled in on the catwalk of the LCM. An 80 foot by 20 foot medium landing craft, she was very well preserved and looked like a ghost ship sailing a phantom course.

Before I could pop the lid off the can, they descended upon me — dozens of fish, mostly groupers, a 30-pounder named "Old Duke" leading the school. I remembered asking Harris, "How to you feed a grouper?" Verrry carefully," he cautioned, "they do have teeth! Ike Johnson had his whole hand ensconced by 'Old Duke' on this same wreck. He smacked the fish with his Leica and it spat his hand back!"

Gingerly I offered the gluttons meat scraps and sardines. Voraciously they devoured them as the cameramen, working from every angle possible, shot the entire feeding frenzy. When I ran out of goodies some of the small groupers snapped at the straps on my BC vest and the string on the tin can. One nibbled at my elbow while another nipped at the hair on my legs! I looked toward Waterman for help, but he just grinned through his mouthpiece. The goodies gone, the groupers left me like a cast-off lover. More at ease now, I remained on the catwalk and watched the team in action.

Clad in wet suit jackets for warmth and Levi's for protection from sharp coral, each photographer did his own thing. They call it free-lancing. Graver took his fins off and tiptoed on the sandy bottom, careful not to stir it up as he stalked a green moray hiding in the well deck. The Chief swam into the pilot house and framed me through one of the port holes. Hess was perched on the stern shooting diagonally into the pilot house. Ike hovered 20 feet above the wreck, securing the entire panorama. Like a trapshooter gauging the flight of a game bird, Waterman panned "Old Duke" as he returned looking for another treat. Mac broke a sea urchin open and drew over a dozen different marine tropicals in for a handout. Woody moved from diver to diver, snapping a variety of shots.

Suddenly a deafening explosion — the damndest noise I've ever heard underwater — broke the eerie silence. It was Harris, demonstrating the team's emergency procedure for recalling divers to the boat. The diving supervisor always carries an M-80 waterproof firecracker taped to a bolt so it will sink easily. Divers can hear it a half-mile from the boat. One time McCraw tossed an M-80 overboard and a barracuda, cruising the bottom at 110 feet, almost swallowed it. When it went off the 'cuda shot to the surface like a rocket, leaped four feet out of the water and disappeared down the reef. I told Harris I thought he threw a grenade overboard instead of a firecracker. He just grinned all the way back to the base.

I was most impressed by the group's unwritten, unspoken, tenacious dedication to teamwork, both above and below the sea. When we returned to team headquarters, each man pitched in with a fervor, unloading gear, recharging tanks, cleaning equipment and automatically going about the myriad tasks of the after-dive. Each diver strings his gear on a lanyard. This way it's easy to keep track of things. One man grabs two or three lanyards of gear and dips them into a large drum of fresh water, while another strings them on a line to dry. Nobody looks after his individual gear. They just grab what's near in an all-for-one and one-for-all effort.

"This is a damn good group, a close-knit bunch," Chief Dick Johnson explained, "and it's team spirit that makes it work. You may hear us bitching, sometimes see us badgering each other, but this is all part of the esprit de corps. Like a team sport, we work together for success. Our major concept is, 'look out for your shipmate — be concerned about his safety and well-being.' There's a common bond here, securing this area, as well as on maneuvers in the open sea. Everybody pitches in. We can't afford to have one guy standing back daydreaming. You may need your buddy to save your life, so



photograph by R. Woods

photograph by Steve Waterman



The top picture shows Chief Dick Johnson, head of the AFCCG diving team. Above, Dave Harris used the DBM-9-1 on the shipwreck. Below, the men are loading gear for a dive.

photograph by Dave Graver





being aware and alert are prerequisites for this outfit."

The Chief practices what he preaches. Commander W. R. Kemp, CO of the unit, told me that long before I met the Chief. "Johnson never asks his men to tackle anything he wouldn't do himself," Commander Kemp lauded. "Soft-spoken and dedicated, he sets a fine example. He relates well to everybody, especially the youngsters, who ardently admire him."

A native of Seattle who grew up in California, and a 22-year veteran, the Chief reminds me of movie actor Jack Palance, especially when he smiles or laughs. Bulging biceps jut out from a sinewy but solid frame. (They all have 16 to 18 inch biceps from toting twin 72's around.) He says very little yet does a hell of a lot. When everything was secured for the day and the divers finally sat back to relax, the Chief was usually puttering around with the diver support vehicle or troubleshooting a temperamental camera.

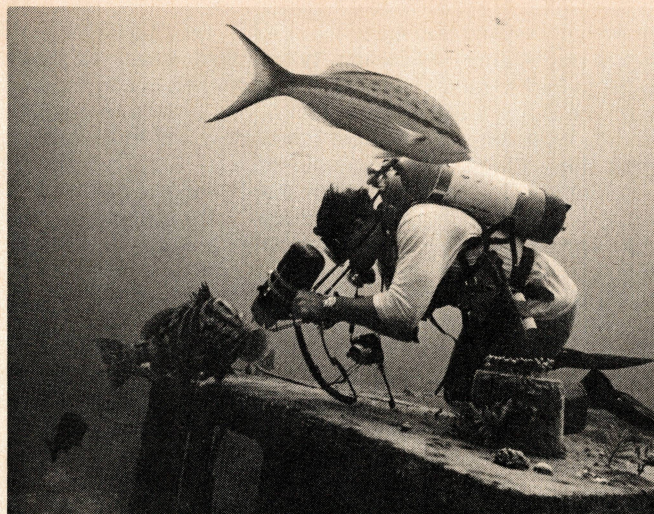
He has what a few leaders possess, the ability to chew men out, sooth them, rib them or command them, depending on the person, time and circumstance. He offers praise when it's due, but lets them know in no uncertain terms when they've goofed. One man put a filter in a DBM-9 movie camera when he shouldn't have. It wasn't discovered until we were ready for our dive, so the camera had to be opened to remove the filter. In a small boat in rough seas this is definitely an AFCCG "no-no!" The Chief's choice words were indelible reminders not to make that mistake again.

Just as an infantryman babies his rifle, so does the Navy diver care for his camera. After everything has been washed down, each man, working on a clean, cushioned workbench, dries and unloads the camera he used. Strobes are dried, checked and recharged, O-rings are cleaned and the entire camera is carefully inspected. Each dive is individually recorded in a master log book. The diver includes his main objective, the camera, film, depth, date, visibility and other pertinent information. Prior to every dive, each man shoots the first exposure of a slate with his name, date, film and camera grease-penciled on it. After the film is processed, it can be matched to the master log and evaluated according to depth, visibility, objectives and other beneficial data.

Records of individual cameras are important, too, especially if there are prototypes still being tested and evaluated. The underwater Leica, for instance, is a prototype the team has been testing for several years. It has an f2.8 water contact lens. The front element of the lens is in contact with the water and can't be used topside. The divers are fond of it because they don't have to worry about critical focusing or depth of field due to its fixed focus feature. Everything from 18 inches to infinity is in focus with this camera! Its 90-degree angle of coverage decreases the diffusion of plankton and algae in the water and enables the diver to get in close to the subject. Compact and lightweight, the camera can be operated with one hand if necessary, while the film is advanced with just a flick of the thumb.

Divers record everything they learn about a camera, whether or not it's easy to use underwater, what they like and dislike about it and suggestions for design modification. These are the men who will have to live and work with these cameras in the future. Their feelings and intuitions are valuable tools in camera design. They'll be using them in every possible underwater location, including some dangerous situations.

For most divers, the prospect of being run over by a ship, 600 feet long, roaring in at 30 knots, is nothing short of a nightmare. But for the Chief, Dave Graver and Steve Waterman, it was all in a day's work. Using 16 mm cameras they shot the hull at various angles for cavitation study. Cavitation is the air cushion formed between the hull of the ship and the water as the screw bites and churns to propel the tremendous weight above it. The movies provide designers with valuable information pertaining to the ship's performance underwater.



photograph by Mac McCraw



photograph by R. Woods

*More action photos of the Combat Action Group: Above, one of the men aims for a close-up of a grouper on top of the wheelhouse of an old wreck. Right, a diver prepares to use his U/W camera in a cavern on the Andros reef. Left, cameras are checked and cleaned after a day's dive.*

"We were ten feet below the *USS California*," Graver explained, "as she made a half-dozen runs starting at five knots, working up to 30. In the beginning we hardly knew she was overhead, but by the time she got to 30 knots all hell broke loose! We could hear it before we could see it. Then, like a freight train rolling out of the fog, she kept coming, all 600 feet of her. At 30 knots the force from the prop drove us head over fins, 20 feet straight down! It was a scary, unique experience."

Waterman, a 6'3", 220-pound human squid, has experienced his share of unique dives, many of them humorous. Deployed from a submarine during the Vietnam war, he was photographing the underwater contours of a Viet Cong harbor. This was, as he tells it, "BS — Before Strobe," and he couldn't figure out what to do with his flash bulbs. "If the bulbs bobbed to the surface they might have revealed our presence in enemy waters," he explained, "so I just broke them against the hull of the sub, not realizing what it sounded like inside the ship." When he returned, the "Squid" saw men scrambling all over the place. The captain had sounded general quarters and the crew was preparing for a defense against small arms fire. "How was I to know that inside the sub my bulbs sounded like mortar shells?" Waterman smiled.

The Andros trip is important for testing and evaluating new camera gear, but it's also an important training ground for new men. Ken Hess, 19-year-old former all-state football star from Curwensville, Pennsylvania, was the only trainee this trip. The husky former defensive end gave up a full scholarship to Penn State in exchange for a shot at a position on AFCCG's elite diving team.

"This is more than I ever dreamed it would be," Hess revealed. "These are the best people in the fleet, close-knit, with common interests — diving and photography. There's unbelievable dependence upon one another, both underwater and above. I get lots of hints and tips from everybody. They



photograph by Dick Johnson



don't always agree with each other, but the good part is they let me do my own thing. I can try all their suggestions and draw my own opinions and conclusions. The opportunities for creativity in this outfit and on these reefs are infinite. If you just use your imagination, the camera can become an extension of your inner self.

"I'm learning more here in actual on-the-job work, than at Norfolk in the swimming pool. The ocean is a lot different. There are currents, buoyancy adjustments, extensive care and cleaning of equipment and other problems alien to the environment. And in a pool you can't back into a sea urchin or a coral head!

"The Chief instills the need for checking little things, often easily overlooked," Hess continued. "He stresses taking the time to do them, both underwater and topside, to avoid a leaking camera or poor photo results. For instance, he showed me how air bubbles sometimes collect in the pocket of the lens of the DBM-5 movie camera, distorting the picture. Now I watch for it and correct it. Graver showed me how to squeeze the grease between your fingers and pull the O-ring through it so you can feel the sand or dirt that's undetectable by sight. I've learned about fill-in flash, bracketing shots, water contact lens, light values and the care and maintenance of a variety of cameras. But I've also learned other things, from throwing a line to the dock to repairing an outboard motor."

Although each member of the AFCCG diving team is a rugged individualist, a team spirit prevails in everything they do. There's an intrinsic talent for every situation. The Chief pilots an airplane, Graver is a mechanical genius, McCraw is a gourmet cook, Harris is a logistics expert, Waterman is a business manager and entertainer, Hess is a heavy equipment specialist and Ike Johnson has a special literary talent. Each complements the others.

In order to qualify for AFCCG a Navyman must be a

Photographer's Mate. He must complete "A" school, a basic photo curriculum that includes training in black and white photography, introduction to color, beginning photo composition, various cameras and their uses, aerial photography, and other fundamentals. "B" school is more advanced. It includes photojournalism, audio-visual techniques, color and quality control, physics, chemistry and other in-depth studies. "C" school specializes in camera repair and motion pictures. The men are not required to attend "B" and "C" school, but most will eventually try to enroll in them.

All are second class Navy divers, skilled in the fundamentals of scuba and hard hat diving, including cutting, welding and underwater demolitions. In addition, Chief Johnson has graduated from first class divers school and McCraw is a saturation diver. Once he joins the diving team a candidate must fulfill five PQS — Personal Qualification Standards. These include underwater still cameraman, underwater motion picture cameraman, diver support vehicle operator, seamanship and diving supervisor.

The team can't separate diving and photography. One naturally follows the other. Thoroughly trained and physically fit for any assignment, these men can travel and sustain themselves virtually anywhere. Tough, observant and tenacious, they're "action ready" at all times. Because of the special efforts and dedicated spirit of these cameramen, the Navy's role in peace and war is being recorded for all time. If you would like more information about this or other Navy groups, call this toll free number: (800) 841-8000.

My last day, on the way to the Andros airport, I passed a sign pointing inland toward the town of Hard Bargain. Maybe it should have pointed the other way, toward the awesome Andros reefs. That's where the AFCCG divers drive their own "hard bargain" with the sea, capturing her innermost secrets for eternity. >>>



# THE DACOR SEACHUTE



## AN EXCLUSIVE SDM PRODUCT REPORT

By Nancy Ackerman

After World War II the popularity of scuba diving greatly increased. Before the 1950's, very little was available in dive equipment, therefore there was very little in diving participation. Evolution and interest in sport diving has been dependent on the development of the dive equipment itself. Advances were made quickly and consistently ever since the Cousteau-Gagnan diving lung invention of 1943.

One of the last basic pieces of equipment to be invented was the buoyancy compensator. In the 1950's the safety vest, or "Mae West," with an oral inflator and CO<sub>2</sub> cartridge was used by divers. But it wasn't until the late 1960's that the buoyancy compensator was invented for skin and scuba diving.

The buoyancy compensator, just as its name implies, is a personal flotation device which should have capabilities of being used as an emergency flotation device at the surface as well as a piece of equipment to trim a diver's buoyancy underwater. Many divers feel that a buoyancy compensator's primary function is to trim buoyancy at depth. However, like any personal flotation device, its primary function should be to assist a diver in trouble at the surface. Its secondary function is for buoyancy trim. There is a bonus in using a buoyancy compensator in that, unlike most CO<sub>2</sub> cartridge vests, a BC can fully inflate at depth to assist the diver to the surface.

With each new diving season we see changes and improvements in this valuable diving tool now considered an integral piece of dive gear. And one of the frontrunners in this category is the newly introduced and patented Seachute Vest by Dacor, combining innovative engineering along with compactness and quality workmanship.

Not only is the Dacor vest innovative but it is also unique

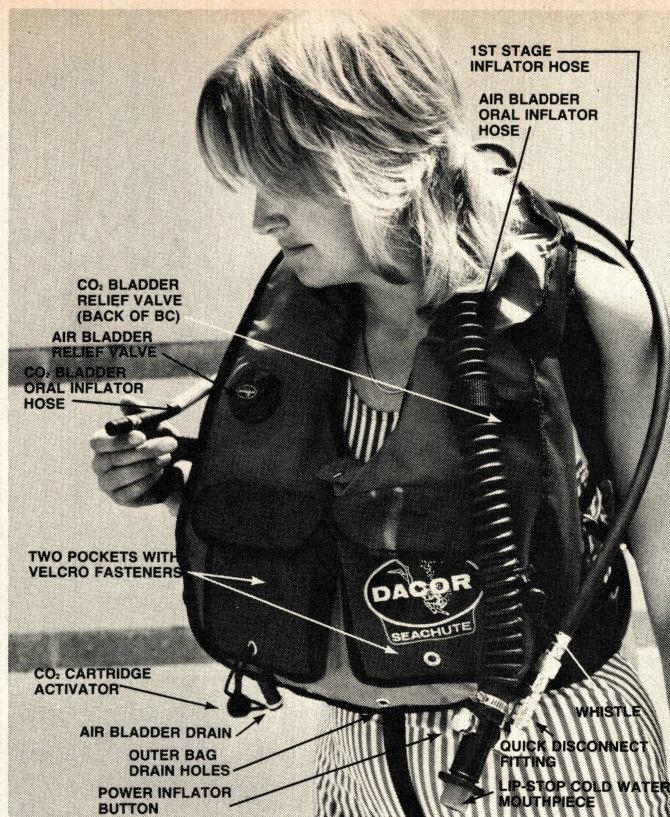
because it boasts triple bag construction — the only one of its kind on the market. There's an outer protective bag made of high tensile strength urethane nylon with ultrasonically welded and sewn binding on the seams. The second and third bags, the inner bladders, are made of tough urethane, which makes them resistant to the deterioration common in many materials because of exposure to seawater, salt air and ozone.

This unique dual bladder design allows for separate compartments for the emergency CO<sub>2</sub> cartridge and the tank inflator system. With these bladders being separate, it would prevent the possibility of a diver accidentally inhaling any CO<sub>2</sub>. There would be no exchange of gases — the CO<sub>2</sub> bladder being completely separate, with its own over-pressure relief valve, drain, and inflate/deflate hose. Also, once on the surface, this vest allows for emergency inflation by the CO<sub>2</sub> cartridge, an alternative to oral inflation or tank inflation.

The new Seachute System allows the diver four-way inflation. One has the option of using the air inflation hose from the tank, using the CO<sub>2</sub> cartridge, or orally inflating the vest by either one of two hoses.

The CO<sub>2</sub> cartridge is easily accessible on this vest as is its separate inflate/deflate hose. Using the automatic inflator is easy, though a diver should remain accustomed to filling the vest orally in case of equipment failure or in case he runs low on air. In this case a diver has a choice of using either the spiral inflation hose attached to the Power Vest Inflator, or the inflate/deflate hose for the CO<sub>2</sub> bladder. The first choice should be to use the hose on the air bladder, as great caution should be exercised when orally inflating the other bladder if there's any possibility of any CO<sub>2</sub> being present.





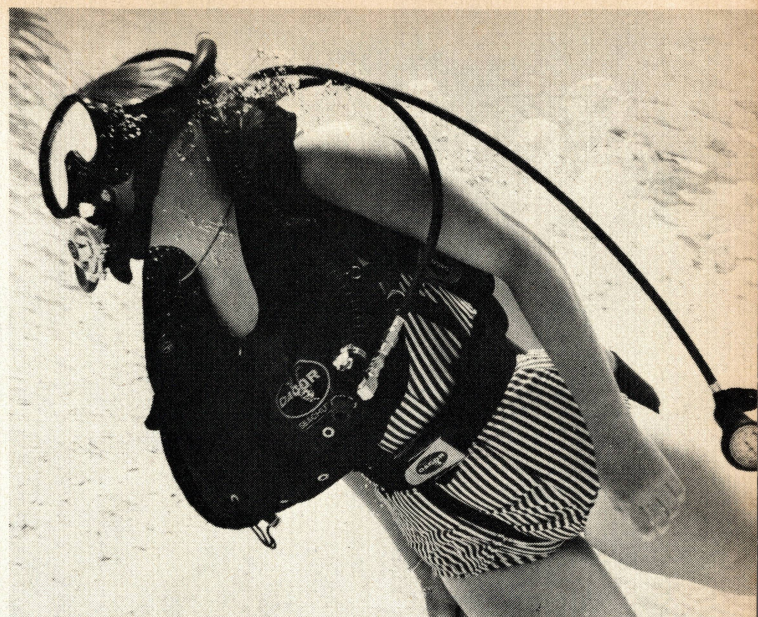
The Dacor Seachute Vest boasts triple bag construction and four-way inflation. This unique bladder design allows for separate compartments for the emergency CO<sub>2</sub> cartridge and the tank inflator system. To inflate, a diver has the option of using the air hose from the tank, using the CO<sub>2</sub> cartridge, or orally inflating the compensator by one of two hoses.

The spiral hose is made of bacterial resistant neoprene. Its mouthpiece, a different shape than a snorkel or regulator, is round and extends down straight from the hose. It fits the mouth comfortably and is a lot more convenient to use than those with a standard type mouthpiece. This hose is kept on the left side of the vest by a loop with velcro on the ends. I found this to be much more secure and I was more likely to find the inflation hose where I wanted it using this loop, than with some other vests I've had occasion to try.

While the automatic air inflator is handy and easy to operate, SKIN DIVER wants to remind readers that lung expansion accidents have occurred in as little as 12 feet of water, and that air embolism can occur in as little as four feet during a breath hold. These automatic devices can be so easily activated that a diver could begin an ascent and travel a lot faster than he intends to. SKIN DIVER recommends that a diver buy his Seachute from a professional dive shop and learn how to properly and safely use the BC. Buoyancy compensators demand proper education by a diver who wants to use it safely.

The Power Vest Inflator, model VIS, attaches to a valve with a quick-disconnect fitting. In case a tank should have to be removed, the vest and hose can also be quickly separated. There are three swivel connections where the inflation hose from the regulator first stage meets the oral inflation hose for the air bladder, for maximum flexibility for comfort in handling and elimination of hose binding and strain. This model vest inflator not only fits the Seachute vest, but also fits the Dacor vests, models, CV-16, CV-25 and CV-50.

The harness has collar-fastened crotch straps and shoulder straps. This eliminates another belt and buckle to clutter one's




photography by Jack McKenney



While the size and weight of this BC is most comfortable, Dacor claims 42 pounds of lift at the surface, which for most situations should be more than adequate. The Seachute proves to be sturdy, innovative, and practical.

waist providing less interference with the other two quick release buckles (weight belt and tank strap) in an emergency. These straps were comfortable when wearing a wet suit, though when not wearing a wet suit jacket, one soon finds out how much tension is put on the crotch strap without a supporting waist strap. This can become uncomfortable when the vest is fully inflated at the surface.

Another point to look for in a vest — is that you make sure the vest expands away from your body and when fully inflated, the vest should stay in place without riding up around your neck. The vest or BC should have a small amount of flotation around and behind the back of the neck. The side stretch panels of the Seachute Vest allow this relatively medium-sized vest a good buoyancy capacity. While the size and weight of this BC is most comfortable, Dacor claims 42 pounds of lift at the surface, which for most situations should be more than adequate. I found the cut of the neck opening most comfortable and the air space around the back of the neck adequate. The pockets in the front of the vest also have good-sized side panels and velcro tabs, making them practical for decometers, treasures, whatever.

The BC-1 Dacor Seachute Vest proves to be a sturdy, practical piece of equipment. While modest in size, its lift capacity is more than adequate. The dual bladder, triple-bag construction and three-way inflation design gives both the safety and flexibility today's diver needs and expects. SKIN DIVER recommends that a diver never dive without some form of buoyancy compensation device. While it is a valuable emergency device, it also is a most useful tool. At \$110, this vest should be of prime consideration to a diver buying a new vest. 







# Ocean Gallery

## The File Shell

By Jack McKenney

Next time you happen to be diving in the Bahamas, off Florida, or in the Caribbean, keep a sharp eye peeled for the rough lima — an interesting little swimming clam commonly known as a file shell. You might even see him galloping across the bottom from one piece of coral overhang to another. Gallop you say? That's right! And not only does he gallop, but he looks like a galloping Santa Claus because he has a mouthful of whiskers that are either snowy white or creamy orange.

The file shell is a shy little mollusk who sports the Latin names of *Lima scabra*. *Lima* is file, and *scabra* is rough. The whiskers that protrude out over the edge of his shell are actually brightly colored sensory tentacles and all along the mantle, hidden between these tentacles, are very minute eyes. The tentacles are capable of being withdrawn into the shell — but not completely. Apparently there isn't enough room inside for himself and all of his appendages and a diver will generally see a few telltale whiskers sticking out around the edges even when the shell is clamped shut. Each half of the shell, which may reach a diameter of two to three inches, are identical in size and are obliquely oval in shape. The overlapping edges that radiate from the narrow hinge suggest the teeth of a file and the irregular, radial rows of short, bar-like ribs, somewhat give the appearance of roof shingles.

If you remain still the file shell will eventually open up and start pumping nutrient rich water into his brightly colored mouth. File shells don't appear to be overly sensitive to light; and if you have an underwater light you'll note that its mantle and entire body cavity is a shade of bright red or orange.

Disturb him and he will immediately clamp shut and perhaps scamper off across the bottom to a less crowded site. He likes to hide under rocks and tucks himself neatly into crevices. When in retreat he swims with a sort of "gobbling" movement taking water in around the scalloped margin and forcing it out in little jets through the protuberances found at the hinge line.

Besides being a traveler *Lima scabra* is also a house builder. He has a very tiny foot from which he can secrete fine plastic-like threads called byssus. With these threads he sometimes builds a crude tubular nest. The nest is open at both ends, permitting the tiny clam to create a feeding current, which flows in one entrance and out the other.



photography by Author



# BERGWALL STUDY PROGRAM

## SKIN AND SCUBA DIVING:

SCIENTIFIC PRINCIPLES AND TECHNIQUES

By Nancy Ackerman

What study program can boast authors who were the committee of the Aquatics Council of the American Alliance for Health, Physical Education, and Recreation who developed the present minimum standards for courses of basic skin and scuba diving in secondary and higher education? Bergwall Productions, Inc., has developed this new study program. It consists of a new textbook, student study guide, and series of filmstrips to completely cover the recommended standards set by the Council for the AAHPER.

The authors of the program, called *Skin and Scuba Diving: Scientific Principles and Techniques*, are Dr. John L. Cramer, Glen H. Egstrom, and Lee H. Somers.

Dr. Cramer is associate professor and director of the Division of Physical Education, Recreation, and Athletics at the University of San Diego. He is also editor and photographer for the Aquatics Council of AAHPER, and is certified as a Master Instructor and Instructor of Underwater Photography by the Professional Association of Diving Instructors (PADI). He initiated basic and advanced skin and scuba diving programs at the University of Washington, University of Oregon, and Hamline University in St. Paul, Minnesota.

Glen Egstrom is an associate professor in the Department of Kinesiology at the University of California at Los Angeles. He also is a past president of the National Association of Underwater Instructors (NAUI).

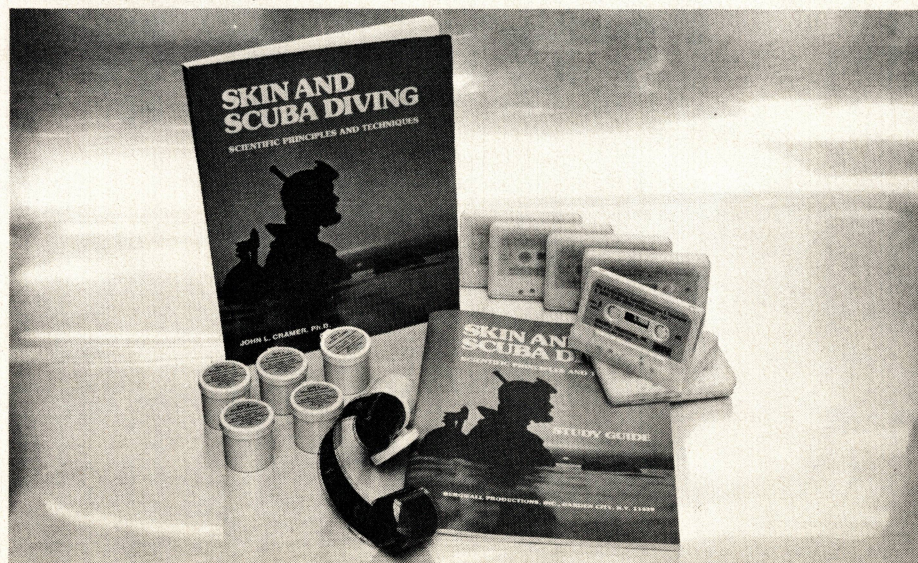
Lee Somers, assistant professor and research oceanographer at the University of Michigan, is a member of the Board of Directors of NAUI.

The skin and scuba diving program consists of a series of 21 color/sound filmstrips, a study guide and textbook. This program meets or exceeds all standards set by AAHPER, CNCA, NASDS, NAUI, PADI, and YMCA.

There are ten units of study in the course; there are 21 filmstrips and 21 corresponding cassette tapes to comprehensively cover the material in the ten study units. The photography and narration are professionally presented. The filmstrips have over 1500 pictures taken from Canada to Mexico to the Bahamas, and the cassette tapes have more than seven hours of synchronized narration. The filmstrips can be shown with a standard filmstrip projector, the tapes can be played on any cassette machine.

The 78-page study guide has hundreds of fill-in type questions and can be used by the instructor for testing, or by a student for study and review. The 176-page textbook is broken into ten

photography by Jack McKenney



1. AUDIBLE  
2. VISIBLE  
3. TACTILE



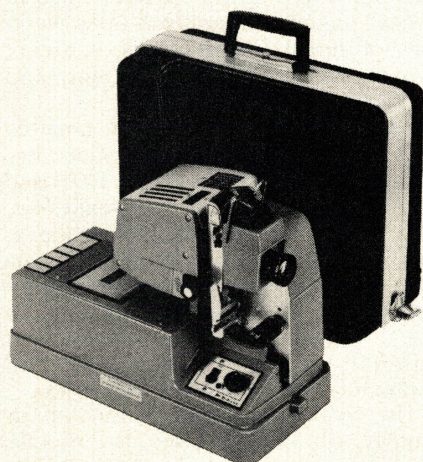
chapters, the same ten study units in the filmstrips and cassette tapes. The book is in a large, eight by ten inch format and is an excellent reference/study text.

The filmstrips, tapes, text and study guide cover these ten units of study: introduction to diving, diving equipment, basic skin diving techniques, underwater physics, medical aspects of diving, basic scuba techniques, aquatic environment, open water rescue and emergency first aid, decompression and repetitive diving, and dive preparation and procedures. These topics are further broken down in each chapter and are complimented with over 200 photographs and illustrations.

The filmstrip/cassette tape program, when bought as a total unit, sells for \$415.80. The individual study units sell for \$22, \$44, and \$66, depending on whether there are one, two or three parts to the unit. For example: the study unit entitled Introduction to Diving consists of one filmstrip and one tape and sells individually for \$22; Basic Scuba Diving Techniques consists of three parts and sells for \$66. Each unit is accompanied by a teacher's handbook.

The list price of the study guide is \$3.50; the price of the textbook is \$6.95. Both are set up on a graduated discount schedule for shops and schools who can buy in bulk to purchase at discounts.

The program has closely followed the curriculum guide set up by the AAHPER Aquatic Council for the recommended minimum standards for courses of basic skin and scuba diving. The textbook is most complete; the study guide most useful for review or testing; and the filmstrips and tapes clear and comprehensive. SKIN DIVER welcomes the interest in study programs for skin and scuba diving and certainly agrees that the program recommended by the instruction organizations should be carefully considered by any school or dive shop interested in such a program.



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## USA ENDORSEMENT

The Our World — Underwater scholarship, sponsored by Our World — Underwater, a Chicago based non-profit corporation, was unanimously endorsed and sanctioned by the delegates at the Annual Board of Governors Meeting of the Underwater Society of America.

This endorsement of the scholarship gives it yet another dimension as the most outstanding underwater scholarship of its type. In sanctioning the scholarship the Underwater Society of America has promised its support to publicize and help promote the scholarship across the country — and to help make available applications to interested and qualified young men and women.

Awarded annually, the \$5000 scholarship takes a young man or woman to the leading activities of diving and diving related scientific expeditions as a participant under the tutelage of leaders in the various underwater disciplines. Mini-scholarships are also made available to finalists and semi-finalists among the scholarship applicants. Funds for the scholarship come from the proceeds of the annual Our World — Underwater show and is administered by the Scholarship Committee and the Board of Directors of the sponsoring corporation, Our World — Underwater.

## BEALL EXCLUSIVE



Glenn Beall/Industries, marketer of sports diving accessories, has named R. Bruce Longman as exclusive sales agent. He will direct all selling efforts except those involving the direct mail and catalog operations.

Longman, who has been in tangible and intangible sales for nine years, has been a PADI instructor since 1970 and has dived extensively in the Great Lakes, Florida, California and the Caribbean. His business background includes a vice presidency in automotive distribution and district sales management posts in the diving field. He has a bachelor of science degree in sociology and economics from Northern Illinois U.

The Beall organization, located in Gurnee, Ill., near Chicago, is currently marketing 19 sports diving devices of its own design and has others in development. Glenn L. Beall, a design engineer, is president of the firm.





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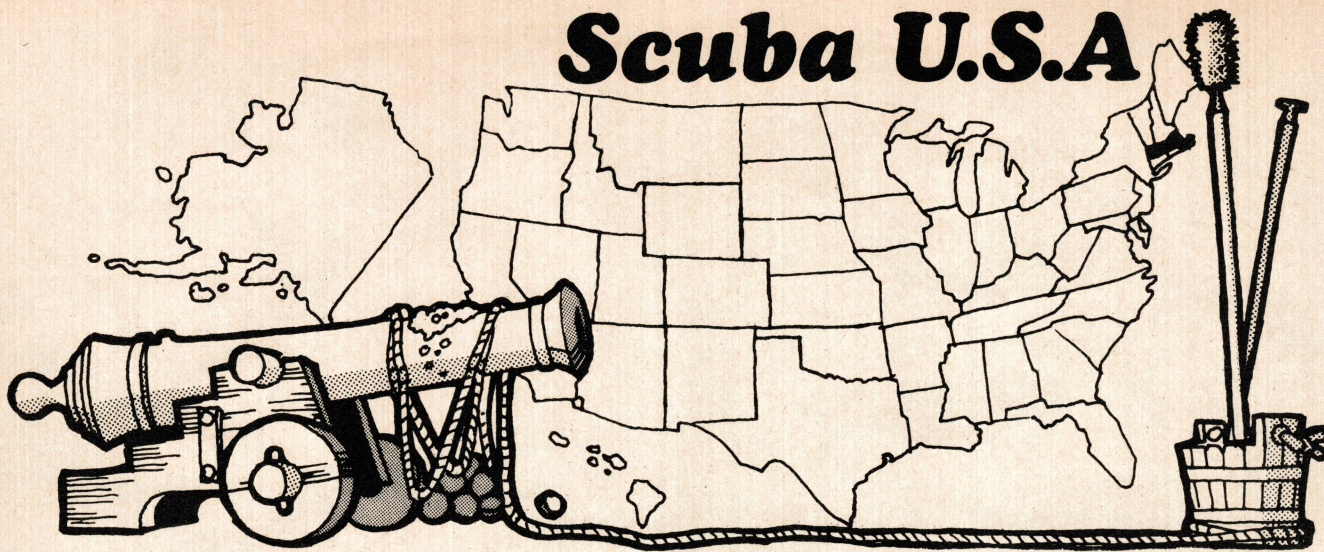
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# Scuba U.S.A



## CAPE ANN

ISOLATED BY A RIVER GONE TO SEA

By Fred Calhoun

Cape Ann is an island. Separated from mainland Massachusetts by a river-gone-to-sea (the Annisquam), Cape Ann bears the scars of having withstood the cataclysm of the ice ages. Great grooves and cracks are in its granite landscape; they continue beyond the rocky coast, clearly visible underwater. Enormous boulders lie about the land and beneath the waves, randomly strewn by the leading edge of the last ice sheet. Cape Ann is a diver's paradise, its rough shore providing sandy beach entries, sheltered coves, gentle sloping rock expanses, precipitous cliffs, and several unique offshore reefs and granite islands.

Divers pursue numerous specialties in the waters of Cape Ann: spearfishing for tautog, perch, pollock and cod, elusive mackerel and flatfish; grubbing for edible scallops and crabs; in-water photography; searching shipwrecks; and hunting by hand for the great northeast lobster, *Homarus Americanus*! On any weekend from spring to fall 300 to 400 divers can be found plying the cool waters off Gloucester and Rockport (the two towns which share squatter's space on Cape Ann). The hearty veterans who frequent this place will tell you flatly, "there's nothing like it anywhere!" Getting to Cape Ann from anywhere in New England is easy, if you drive. Cape Ann is at the upper northeast end of Massachusetts Route number 128. For out-of-towners who might be on a weekend trip flying in and out of Boston's Logan International Airport, Cape Ann is only 45 minutes away by rental car.

There are several dive guides listed



photography by Russ Kolirath

under "Skin Diving Instruction" in the Boston Yellow Pages; also, "Underwater Safaris" (a professional dive guide service) is located right on Cape Ann. Their telephone, (617) 283-4933, is monitored 24 hours a day and they can provide up-to-the-minute dive conditions information for the Cape Ann area.

The main access highway is Route 128. It races across a wide stretch of salt marshes as it approaches the island and then rises majestically at the A. Platt Andrews Bridge, soaring 65 feet in the air

over the Annisquam River and descending to its landfall intersection with the island's circumferential road, Route 127. Seldom more than eyeshot distance from the sea for most of its length, Route 127 brings the diver to the dive sites of Gloucester and Rockport.

Seven miles along the circumnavigating road Route 127 from the landfall intersection head north, the motoring diver will come to Phillips Avenue leading down to the sea, and to a very fine old grand hotel, the Ralph Waldo Emerson



Inn. The Inn is unique for several reasons, two of which are: that divers are always welcome (gear and all); and that it sits on the finest dive site available on Cape Ann, Cathedral Rocks. It's always wise to call ahead for reservations — (617) 546-6321. Prices at the Inn (site of many divers' clambakes, instructor training courses, and dive school weekends) are moderate, accommodations are fine and the food's great!

Neither a "point," nor a "cove", Cathedral Rocks is more of a coastal indentation. It boasts excellent diving. The above water rock formations range from tumbled crack boulders to sloping expanses, providing some adventure in just traversing them. The above water profile, which is fairly steep, is continued directly into the sea, on out for about 250 to 350 yards to the sea floor, resulting in a maximum water depth of 80 to 90 feet. Cathedral Rocks shore line is half mile long offering a wide variety of underwater experiences throughout its length. Close by shore in the waters of the southern portion of the Rocks are many fascinating valleys and rifts formed by enormous boulders. One spectacular feature is called Fisherman's Canyon. Contrasting this rough terrain is the sloping granite floor off the northern coast. A straightway healthy swim from that part of the northern coast characterized by a covered storm drain, termed "the mole hole," is the dive site called The Ledges, 100 to 200 yards off shore. The Ledges boasts typical marine life and an interesting terraced bottom.

A pastime pursued all along Cape Ann's coast, and no less enjoyed in the waters of Cathedral Rocks, is lobstering. Lobstering is an activity engaged in by both the boating public as well as the diving public. Rather than further enflame the feelings between the two groups by a careless choice of words, the following differentiating phrases have experienced wide acceptance — boating lobsterers, and diving lobsterers. Regardless of the method of pursuit, all lobsterers must be licensed by the Commonwealth of Massachusetts. Perhaps not a possibility for the visiting out-of-state diver. However, the watching is as good as the doing.

Catching lobsters by hand is neat. There's an entire cult of divers who pursue this specialty with a noticeable glassy stare in their eyes. Armed with prods (old snorkels, gnarled reserve rods, rusty coat hangers) they spend their dive time grubbing under boulders, upside down with a far away look on their faces, their arms often extended to the pits into a hole, a sack or mesh bag gripped in the free hand, and a mask at least half full of water. It's a glorious experience!

Lobsters are caught by quickly grasp-

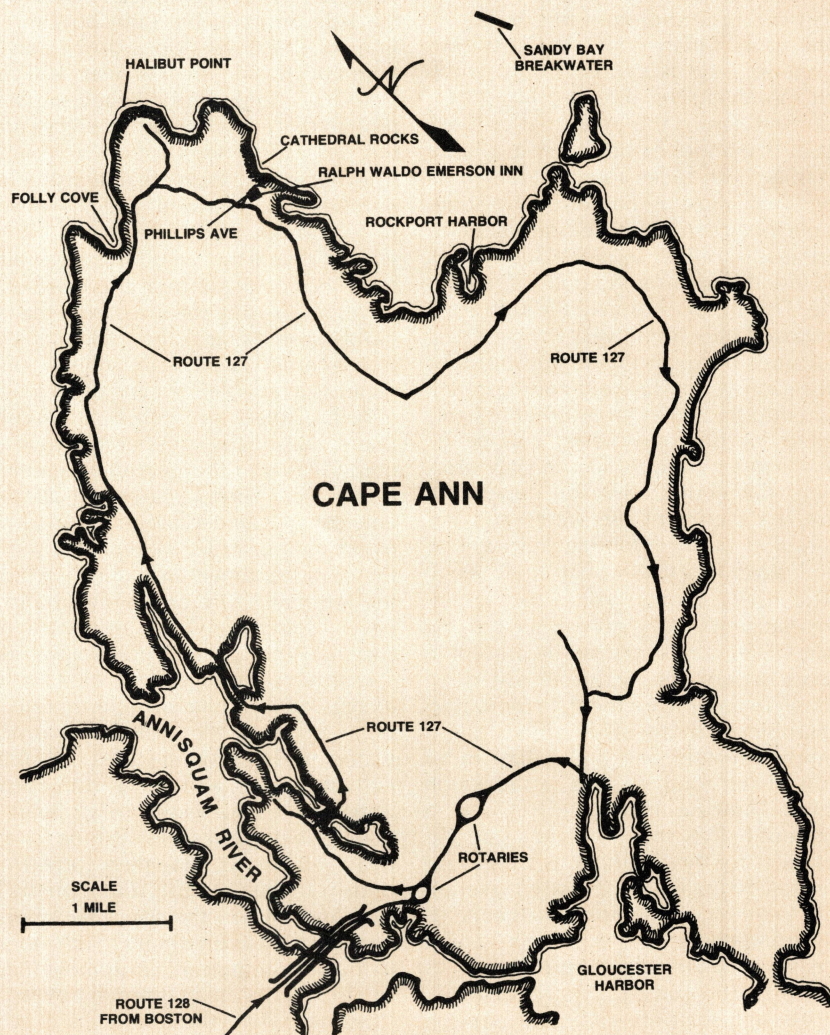
ing the body (that's the part behind the claws — the claws are up front usually — pointing toward the person planning to grasp the body). Once grasped, the lobster will assume the classic 'Y' position — arms and claws spread wide, trying to grab behind itself in an attempt to get free. Although an intimidating act, and it does bluff a beginner, a lobster cannot reach behind itself.

Now, before one can grasp a lobster one needs to find one. Lobster are seldom found roaming about in the open. The inverted, arm-up-to-the-pit-under-a-boulder posture is the professional's way of doing it. The beginner is well advised to look before offering a hand to the underside of some boulder. As a result of having to back into its hiding hole, the secretive lobster leaves a telltale pile of sand just in front of its house. These sandhill welcome mats are about the only things that the glassy-eyed diving lobsterers are able to see while underwater. Don't forget, most of them spend their time up-side-down!

Driving one mile north from the Inn will bring the motoring diver to the well

posted entrance to the Halibut Point Reservation. Living next to a public reservation has made some of the abutters parking lot entrepreneurs. For a very reasonable fee, one may park an automobile all day. Halibut Point boasts longshore currents and is one of the first obstructions which offshore swells encounter as they approach the land. It can be spectacularly rough here! Having survived the hike from the parking area, and having put the thoughts of the return trek out of mind for the time being and having been greeted by moderately calm seas flowing over the point, the visiting scuba enthusiasts can look forward to an interesting exposure in Halibut Point's water. The land mass of the point is aimed north; its surface for the most part is sloped, and it slides right into the water continuing down and out dropping to 60 feet about 300 yards from shore. It's all rock — huge fissures, flat slopes, plains, mammoth boulders and more rock. In the shallow reaches, abundant growth clings to the firm footing.

There are six general zones into which this kind of rocky shore may be sub-





divided, based upon the kinds of plants and animals which live in each. At Halibut Point a diver may recognize each one of them. The first one is of interest and importance because it is slippery. The black zone marks the average high point that the ocean reaches on the land. This zone is covered by algae, and matted and dried by the sun, the algae at times appears black. Whether black, or blue-green, or green — it's always slippery! Climbing into the water through the black zone must be done cautiously.

Below the black zone are the periwinkle zone and the barnacle zone. Periwinkles and barnacles intermingle in this two-zone area (actually it's the periwinkles who do the intermingling as the barnacles are permanently fixed). Barnacles provide sure footing for the diver who has slipped past the black zone — they also tear exposure suit material and can easily provide infectious cuts and abrasions to people.

Below the periwinkles and the barnacles is the rockweed zone, named after the seaweeds which live there. Seaweeds with air bladders (fucus and knotted wrack) lie about limp when the tide is out, and float upwards when the tide is high. Numerous other plants and animals live in the shelter of this zone.

The zone of Irish moss is the next lowest region — it is exposed only twice each month during the very low tides. Short and scrub, the autumnal colored tufts of Irish moss carpet every available unit of area on rocks and boulders in this zone. Irish moss is harvested by some people for an extract, called carrageenin, used as a stabilizer in processed foods.

Below the Irish moss zone is the kelp zone. The upper portion of the kelp zone is exposed only at the very lowest tides. Such tides occur in this region but four times each year. The kelp zone extends down into the sea as far as useable light, needed for photosynthesis, can penetrate — about 70 to 90 feet in Cape Ann waters. Generally, however, depending upon the clarity of the water and the availability of a firm footing, kelp will be found down to a depth of 30 to 40 feet.

The rocky shores' zones are recognizable practically everywhere. Some of the lower zones may not be present in places where the water is not deep enough to provide for them. In the waters of Halibut Point all zones are visible.

Approximately one and a half miles north of the road leading to the Ralph Waldo Emerson Inn is Folly Cove, a wonderful dive site providing safe experiences for the beginner as well as interesting diving for the seasoned veteran. Folly Cove faces due north — that is, its seaward opening faces due north—and it boasts a peculiar political problem — its "open-to-the-public" (sticker-only, big-enough-for-only-six-cars) parking area is in the city of Gloucester while the



major portion of the cove is in the town of Rockport. Divers operating in groups (two's a group) can unload their gear at the cove parking area, leave someone to guard it while the car is driven a short distance up a side street. When shuttling's done it's only one person who has to walk any distance. Folly Cove, when weather's right, it's worth all the effort.

The left wall (or "far wall") is almost a vertical cliff above water. Underwater, the side drops to the sand bottom. The floor of the cove slopes down and out gradually to a depth of 60 feet, 400 yards from the cobbled rock beach entry. Although there are numerous places along the left wall where a diver may climb from the water, these are only water level perches, as overland access into the water cannot readily be made. The left wall is dived by swimming to it, either from the rocky shore at the head of the cove, or crossing the cove from the right hand coast. As far as the right hand coast is concerned, access in and out of the water is available for most of its length.

Folly Cove's left wall is a marvelous place. During the summer it is alive with many fish, and the perennial anemones flower year round, carpeting all available surfaces under and in the shadow of overhanging rocks. Where the sand of the cove floor meets the cliff-like face of the left wall there are many small rock caves, some of which are guarded by *Lophius Americanus*, better known as the "American goosefish". Armed with an exaggerated reputation, old *lophius* can boast of being the ugliest fish in these waters. Possessing no scales, and practically no bones, and being from outward appearances possessed of all head, the goosefish occupies itself fishing for other fish! Settling its shapeless torpedo-like body into the sand (it's round on the bottom and flat on the top) the American goosefish waits for dinner to meander by. With all its important equipment located on top of its head (mouth, eyes, and "fishing pole") the animal is a perfect sniper. The most forward spine of its dor-

sal fin has become specialized — separated from the rest and capable of articulation in any direction, it is tipped with a fleshy particle designed to look like an interesting morsel. When camouflaged, the fish becomes just two eyes and a fishing pole sticking up above the sea floor. Attracted by the pulsing movement of *Lophius's* fly rod, any fish inquisitive enough to venture too close gets itself inhaled. The goosefish can swallow anything — correction, everything! *Lophius Americanus* grows to lengths exceeding six feet with accompanying widths to three feet. Folly Cove specimens of this inedible creature come in lengths of up to five feet. Goosefish are harmless and homely, two qualities which divers seem unable to ascribe simultaneously.

In the center of Folly Cove is a sand "desert". Sand waves, in almost flawless procession, march in from the sea, their parallel valleys provide a variety of terrain for the vagabond shieks-of-the-sea to race with great precision. The hermit crabs make their way back and forth along the dunes snatching scraps of food, issuing challenges and rolling up inside their borrowed shells at the first hint of trouble. Small hermit crabs live in periwinkle shells while the larger species must search out moon snails and welk shells in which to set up housekeeping.

The crabs share the center of Folly Cove with numerous other small animals, one of which is the sand shrimp, sometimes jokingly called the "ricochet shrimp" because of the manner in which it moves. Sand shrimp are very small, usually no longer than an inch, and almost totally transparent. In order to be seen they require of the observer patience and a steady stare. When they move it seems quite an unorganized act — here a sprint, there a sprint. They even look surprised when they've stopped!

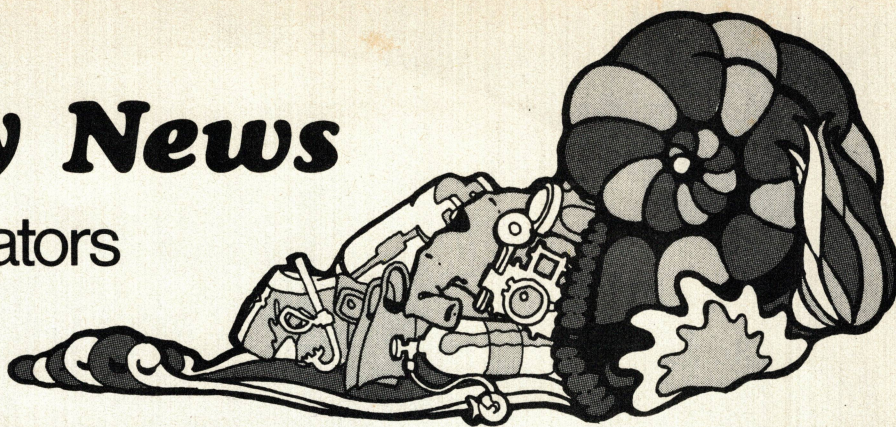
With the meandering ramble of the hermit crab as melody and the helter-skelter staccato movement of the ricochet shrimp as background, the Cape Ann beat goes on . . .



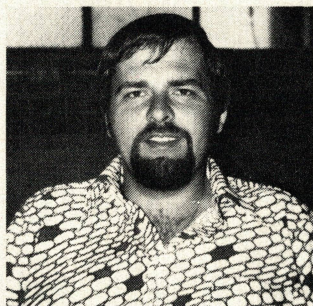
# Industry News

## Parkway Fabricators

By Nancy Ackerman



Isidore Laks



Ken Musiakovich

**F**rom their unique beginnings as a men's clothing manufacturer in South Amboy, New Jersey, Parkway Fabricators have come a long way.

In 1957, Parkway Fabricators began their production of wet suits with the Rubatex Company supplying the rubber. In 1961 they discontinued their men's clothing business and went exclusively into the manufacturing of wet suits. To this day they are continuing in the same direction — as Frank Sanger, their president, puts it, “doing the things we know how to do best” — manufacturing wet suits.

Frank Sanger, himself, has had 25 years in the diving business. His experience ranges from the retail field and store management, to both sport and commercial diving and sales. His educational background is in chemical engineering, and he is also a certified instructor for NAUI and YMCA. He has been with the Parkway company since January of 1974, and this is his first time in the manufacturing end of the business.

But Frank Sanger wants it to be understood that Parkway “. . . is a team thing . . . The word ‘I’ doesn’t exist” — and two of the other people on the Parkway “team” are: Isidore Laks, the production superintendent who is from Lima, Peru, and later attended college in Israel; and Ken Musiakovich, the company's comptroller.

Parkway is also very proud of their product and of the uniformity with which it is made. They insist on one basic supplier for their neoprene, Rubatex, providing the necessary consistency in the raw materials for their specifications.

Parkway has several other unique features to boast about in their wet suit line.

One of these features is their multi-glue process. First, all Parkway seams are primed, double-glued, and then lock-stitched. This is done on every wet suit seam and finished with Dacron thread. The lock-stitching prevents unraveling and stress points are bar tacked. The Dacron thread eliminates the possibility of seam failure.

Another unique feature of Parkway is the registered name Shark-Skin and Shark-Skin Two. This textured material was originated and developed by the Parkway company.

Men's, women's and children's suits come in a complete range of sizes. The Parkway emphasis is on “shelf” suits, and




Frank Sanger

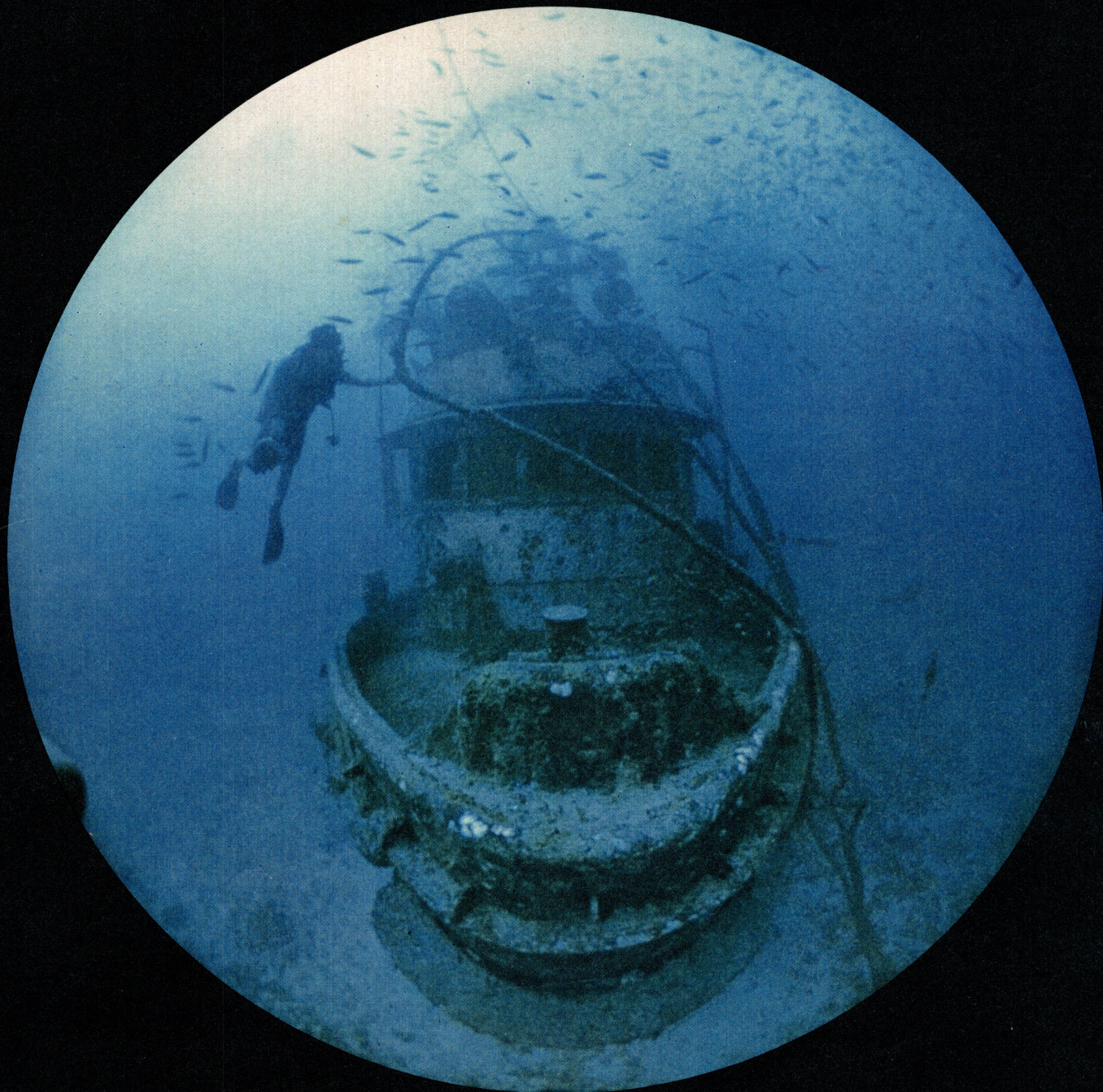
they estimate that only one percent of the divers buying a suit may need a size suit that they don't normally produce. For example, men's suits come in X-small, small, medium, large, X-large, XX-large. Women's suits, children's suits, gloves, socks, boots and hoods are also available in an impressive, large range of sizes.

Still another facet of the Parkway Fabricators company is the Poseidon Systems, U.S.A. Late in 1969, Parkway obtained a license from Sweden to build the Unisuit from scratch for the Western Hemisphere. They import the Cyklon 300 regulator and are the only licensees in the world. The only other manufacturer of the Unisuit is the original company in Sweden.

The Poseidon System was acquired because it was felt to be a part of Parkway's innovative stand in the field of exposure suits. And innovative it is — there have been many who have tried to copy the Unisuit pattern all over the world.

The words “unique” and “consistent” can be used when speaking of the Parkway product. They are not a new company in the wet suit business — they have been manufacturing wet suits for 18 years. And for that 18 years they have consistently put out a superior product in keeping with the advances made in the diving industry — which is what will allow Parkway Fabricators to be around for quite a few more years. 





# COFFEE BREAK AT 130 FEET

By Bob Smith





photography by Rick Fretsee



I sat on the table in the galley of the oceangoing tug; my legs swinging loosely over its edge while I idly watched my friend "TJ" Holub leafing through the tattered pages of a magazine in the crew's quarters just across the companionway. The compartment, with a coffeepot squatting on the stove, seemed warm and cozy; a welcome haven from the less sheltered environment above deck. However, in spite of the carefully dogged hatch through which we had entered, the interior of the boat could not in all honesty be described as "dry." We were, in fact, completely immersed in water — submerged 130 feet beneath the sea off Key Largo, Florida!

Incredibly, this unlikely scene had not been staged for some movie. Except for the coffeepot — which had been retrieved from the deck and restored to its usual dignified position following an earlier underwater toast by TJ — everything was just as we had found it upon entering the wreck. Remarkably, the pulpy magazines; the tattered clothes still on their hangers; tables; chairs, everything — were still intact after more than a year on the ocean floor!

The stage for our dramatic experience had been set in February 1973; when the 70-foot tug *Ice Fog* foundered in heavy seas off the coast of Florida. Her cargo barge full of molasses broke loose and grounded, ironically, on Molasses Reef; and after a somewhat more heroic stand, the *Ice Fog* herself went down on the edge of the Gulf Stream. Her crew was picked up by the participants in what must have been one of the season's most exciting sailing races. The estimated position of the sinking was noted and everybody called it a day.

The following morning TJ and his partner, Larry Bateman, were cruising in their charter boat *Yellow-Bird* several miles from the reported site of the incident. They came upon a heavy piece of hawser floating on the surface and apparently tied or fouled to something more than 100 feet below. Not being equipped that day for deep diving, the two fearless adventurers secured the hawser to a stern cleat, slowly took up slack, and then applied power to both engines.

The *Yellow-Bird* probably is the fastest charter craft in the northern Keys. It is, therefore, not without power. TJ reports



The *Ice Fog*, a 70-foot tug, sank in 130 feet of water on the edge of the Gulf Stream off Key Largo, Florida. The wreck is unique in several respects: there was almost no damage to the boat; some of her instruments remained watertight; there was virtually no floating debris in the hull.



that "when our stern settled down into the water we began to suspect that we really had something." The two had little recourse other than to buoy off the line and return another day.

"Another day" turned out to be almost a year and a half later. Several days of continuous storms followed the initial marking of the wreck and the buoy was swept away. Larry and TJ searched month after month for their elusive quarry — several miles from where everyone else was looking. One afternoon in July 1974 TJ called me — they had found the *Ice Fog*, and it was "perfectly intact."

TJ inquired as to whether I would like to dive the wreck. It would be a hairy dive. Besides, as I explained to my enthusiastic friend, I had other commitments to meet — family plans, an impending business trip, etc. An individual with my responsibilities can't afford to just drop everything and dash off to go diving every time an old cronie calls.

TJ began to describe the condition of the wreck to me in more detail. As I rushed past my secretary and toward my car I mumbled something about responsibility and asked her to please hang up the phone for me.

My friend was right about it being a pretty hairy dive. As we approached the wreck site the next morning the Gulf Stream rushed by at a surface speed of better than four knots. Capt. Tommy Harris, who had originally located the sunken grave of the *Ice Fog*, roamed out ahead of us in his sports fisherman the *Fantastic*, his depth recorder sweeping the bottom. He found the wreck on the first pass.

As we passed over the submerged marker buoy TJ asked me to pop our stern drive into neutral and with a dramatic display of timing and agility, he dropped into the water with a single tank and secured a line from our boat to the submerged hawser. Following this small feat, he was pulled back into the boat by Bob Collins, an old friend who had served with my research diving team through almost ten years of adventures, including five habitat dives.

Bob would support us from the boat today; and we were

glad to have him; particularly since Larry couldn't join us. He had served another vital function earlier in the morning when he had roared out of the harbor in the conspicuous *Yellow-Bird* — headed away from the wreck site.

He had been followed. There were those whom Larry & TJ feared would like to salvage the *Ice Fog* by blowing off her props, and then blasting her deck open to gain access to her engine blocks. These two weren't about to let that happen if they could help it. Thus, while Larry charged noisily off in the wrong direction, Bob, TJ, and I quietly departed the harbor in a small fishing boat; our scuba gear stored out of sight and our fishing poles rigged for trolling.

Our trolling that morning was quite successful — we were ready to dive before 9:00 a.m. It would be my first dive on the sunken tug, and TJ's third. Our dive plan allowed for 30 minutes of bottom time; necessitating some decompression in the fast current, but permitting thorough coverage of the wreck if all went well.

A line had been rigged running aft from the bow of our small craft for use in pulling ourselves forward to the descent line following our entry near the stern. After a final equipment check I allowed the weight of my doubles to topple me backward off the gunwale; the bow line gripped securely in one hand. As I entered the gently swelling Gulf Stream, I was instantly jerked out on the line, like a pennant snapping in a stiff breeze.

Following a quick check to confirm that all of my equipment, including underwater light, arms, legs, etc. was still attached; I pulled myself hand over hand toward the bow. The first time that I sharply turned my head to check TJ's progress the current scolded me by threatening to dislodge my mask. From that point on, I looked over my shoulder with a little more discretion. We paused on the descent line to catch our breath and set our bezels. Then we started toward the wreck.

At the age of 12 I developed my concept of what sunken ships look like on the ocean floor as a result of viewing a John



Wayne movie. In subsequent years this idealistic vision was repeatedly dashed against the hard rocks of reality as I swam over the rotting timbers and shattered plates of the actual wrecks which I explored. My vision was about to be restored.

As we passed through 50 feet the current began to slacken slightly and the outline of the sandy bottom could be detected another 80 feet below. As I increased my rate of descent and looked up from the bottom the *Ice Fog* came into view ahead of us. We were descending upon her bow-on. Her keel rested on the bottom with fully three-fourths of her hull exposed.

She listed almost imperceptibly to starboard, as if underway and in a gradual turn. This illusion was enhanced by the gentle rippling of the canvas awning over her fly bridge, as if ruffled by the breeze at flank speed. Actually the motion was caused by the current running from astern, and as we approached, the illusion was broken by the sudden motion of hundreds of fish in her superstructure.

The radar antenna and the two big search lights mounted in the cabin house were virtually free of marine growth, and one of the lights turned easily in my hands as I pulled myself down onto the bridge. Two windows were broken cleanly out of the forward bulkhead of the cabin house. These were the only broken items I was to see on the wreck for the rest of my dive.

The window casings were big enough to swim through, and TJ and I made our entrance into the cabin house through those portals. I swam in over the compass housing and immediately noticed a shining chronometer on the aft bulkhead. Inside its unbroken glass face it was completely free of water! I must admit that it was no longer running, but before I could note the time at which it had stopped for historical purposes, my attention was drawn to TJ. He was standing at the helm in mock dignity, peering out into the mist past a startled amberjack who had happened past the cabin window. The steering lever moved easily in TJ's hand, but the stubborn tug refused to respond to her helm.

We had to move on if we were going to explore the full length of the sunken tug. I eased out of the cabin window and fell slowly to the foredeck. The current was still noticeable at this depth, but we could easily swim against it. Nevertheless, to save energy and air I used the handrail to ease my progress aft to the main cabin door on the port side. I again wondered at the lack of growth on the railing. Had some marine ghost been down here chipping and painting all this time? Perhaps he was in his bunk below. Once undogged, the heavy cabin door swung easily back on its hinges. We secured it, turned on our lights, and dropped down the companionway below decks. The water inside the wreck was very clear, and we applied our best cave diving technique to avoid stirring things up and making our return trip any more exciting than necessary.

Another watertight door at the bottom of the ladder led forward to the crew's and captain's quarters. No one had explored that part of the wreck as yet. We opened the door against the current with some difficulty. TJ swam through the opening and found that by stretching a little he could get a view of almost all of both forward compartments while still keeping "one foot in the door."

Then TJ and I each made a mistake — at the same time. He swam a foot or two further into the forward cabin just as I looked back over my shoulder (something I do a lot in dark places under the water). Naturally the Gulf Stream chose that moment to push the heavy door closed behind TJ. Never has the reopening of a door received so much attention — from both sides. We got the door open again almost instantly; or so I recall. TJ reports that it seemed to take about two hours.

This experience gave us the great idea of blocking the door open with a heavy bar. This allowed us to fully explore both forward cabins as well as the galley just aft of the stairs, without losing sight of each other. The result was the somewhat bizarre experience with which this story began; TJ rum-

maging through the crew's quarters while I relaxed in the *Ice Fog's* galley.

The entire dive was a remarkable experience in several respects. First, there was almost no damage to the boat from her fall to the ocean floor. Second, the watertight integrity of some of her equipment (i.e., instruments, the running lights, etc.) was impressive considering the four-atmosphere pressure change to which things had been subjected.

A third unique characteristic contributed greatly to the safety of the dive. On previous wrecks in my diving experience, where it had been possible to penetrate the hull, considerable hazard was involved due to floating debris. Not only small objects; but tables, chairs, and other normally deck-based items would suddenly be encountered in such unlikely locations as the ceiling of a compartment. This wreck was an exception in this respect; why, I'm not sure. Perhaps because this was a relatively small craft designed for heavy ocean duty, her builders had been particularly careful to secure everything against a heavy sea; perhaps she sank so gently that nothing broke loose; perhaps nothing inside was buoyant — who knows — but we underwater interlopers were grateful.

Finally, there was the phenomenal near-absence of decay — particularly unlikely in this latitude. Clothes hung (albeit in shreds) in closets; mattresses sat intact on the bunks; and under each mattress was the crewman's favorite reading materials. The latter disintegrated in our hands, and in some cases we were truly sorry that we could no longer make out the pictures. I have never dived a wreck at so great a depth in the Keys; perhaps the area has properties similar to Truk Lagoon, which preserved the Japanese fleet for a quarter century.

Actually, we didn't take much time to ponder the chemical properties of our environment while inside the wreck. With ten minutes of bottom time remaining we were back on deck and heading aft again — escorted by a matched pair of 100 pound groupers. They obviously regarded the *Ice Fog* as their wreck. They refused to move away from their inadvertently-man-made reef; assuming, I suppose, that they could outlast us. They were, of course, correct.

We dropped off the stern of the tug and through a thermocline into an icy-feeling layer of water about three feet off the bottom, at 130 feet. The cold water was almost forgotten as I gazed at the big props, which stood completely free of the sand. Covered with a thin layer of hard coral growth, they presented a tempting trophy for any salvor — I could understand Larry and TJ's concern.

The water temperature and a glance at my watch abruptly encouraged me to tear my eyes from this vision and crack the valve on my BC cylinder for the return to deck level.

We struggled with and finally defeated the six dogs on the engine room door, but the battle left us with insufficient time to safely penetrate that compartment. We consoled ourselves with a quick inspection of the engines via the beam of our lights from the doorway. Their bright yellow paint still gleamed through the thin layer of sediment which covered the big twin diesels.

Carefully dogging the hatch behind us, we began our ascent. We flew over the wreck from stern to bow, angling up toward our ascent line. Decompressing in the strong current was challenging, but once we both found a comfortable way to hang on, everything went smoothly. During our ten foot stop a pilot fish joined me and hung like a sentinel three inches before my eyes. I took advantage of the opportunity to describe my dive to him in great detail.

Experienced divers now have a great wreck to explore right here in the Florida Keys. If you want to try this adventure, just contact Larry or TJ at the Coral Reef Marine & Airport in Key Largo, Florida. If no one answers, it may mean that both men are relaxing over a good book in the galley of the *Ice Fog* — 130 feet down. >



# News Briefs

By Hillary Hauser

## DUKE DISCOVERIES

Duke University, North Carolina, has developed what they believe is the "fastest and safest decompression schedule for divers returning from 500 feet." They have also discovered a technique of mixing a diver's breathing gases in a combination that will allow him to descend to the ocean floor at a fast rate and be completely functional, physically and mentally, when he gets there. Dr. Peter B. Bennett, director of diving research at Duke, recently announced the new techniques and stated a need for more financial support for such studies — especially from oil companies who are sending divers deeper into the ocean in quest for oil reserves.

In the Duke tables the diver can spend 30 minutes at 500 feet and return to the surface in just over 12 hours, as compared to the 17 hours required by U.S. Navy tables. The difference is that Duke tables decompress divers more slowly at deeper depths, allowing him to be brought to the surface more quickly once he reaches shallower depths. The theory is that when a diver is brought out of the deepest part of his dive too quickly, gases have a chance to form bubbles which take longer to expel from the system in shallower waters. Under the Duke system the time spent at depth prevents the gas bubbles from forming at all.

## SCUB-A-THON

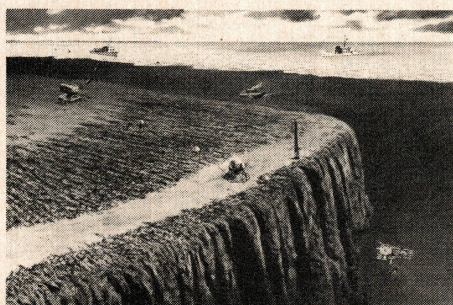
This month Kansas City divers are plunging into the 1975 Jerry Lewis campaign against muscular dystrophy by staging their own Scub-A-

Thon. Divers from the Kansas City Frogman Club are soliciting sponsors who are donating whatever they desire for each hour that divers remain underwater. The 24-Scuba-A-Thon starts Saturday, August 30, at 12 noon. The Jerry Lewis Telethon will begin the evening of Sunday, Aug. 31, 1975, at which time Lewis will receive all money acquired during the Scub-A-Thon drive.

## CANAL CLEARED

Divers have cleared the Suez Canal after diving nearly every day for seven months. The operation removed 10 major wrecks sunk by the Egyptians in 1967 to block the canal, as well as smaller wrecks. The divers, working for Murphy-Pacific Salvors, were plagued by unexploded bombs that, during the operation, had a ten-

dency to go off. After one went off while a diver was in the water, Navy explosive ordnance disposal experts cleared out 13 such bombs. Still, two more exploded while the operation was underway. The recovered ships were cut up into 500-ton pieces and dumped in the Mediterranean in a spot off Port Said and alongside other, earlier wreckage in the Bitter Lakes



Artist's conception shows activity in SCORE. Exploration of the vertical wall of the coral reef was done by NOAA, Harbor Branch and Perry Foundations. Equipment included Hydrolab, Sub-Igloo, Sea-Link, USIC, Sea Hunter, and surface ships Undersea Hunter and R/V Johnson.

## SCORE!

The future has arrived.

A major undersea research operation, aimed at the preservation of threatened reef environments was launched in April with the cooperation of the Bahamian Government. Called SCORE (Scientific Cooperation Operational Research Expedition), the operation involved the latest in undersea equipment. Participating in the project: the *Johnson-Sea-Link* submersible, which was used to shuttle divers from *Hydrolab* to research sites and depths 190 feet deeper than the lab which is stationed at 60 feet; *Sub-Igloo*, the famed spherical ice station, which was anchored on top of a vertical wall of a coral reef at approximately 200 feet; *Perry Shark Hunter*, a wet sub that was used as a diver taxi. In addition, a tall cylinder was anchored on the edge of the wall. Called USIC (Undersea Instrumentation Chamber), it housed oceanographic instruments. Surface support ships were the *Undersea Hunter* and *R/V Johnson*. Divers and scientists working in the project included

C. Lavett Smith of the American Museum of Natural History, Sylvia Earle of the Los Angeles Museum of Natural History, Bob Wicklund of the Perry Foundation, Roger Cook of Harbor Branch Foundation, and Dick Clarke of the Bahama Underwater Explorers Club.

In the experiment, *Sea Link* was used by divers to examine the face of the coral wall, with divers looking out at 250 feet. The vertical wall forms the edge of the Continental Shelf and drops off to 3000 ft. Four teams of diver-scientists saturated in the Perry *Hydrolab* for five days each at a depth of 60 feet. *Sea-Link* then picked up two members of each team and took them to deep water. Other members swam from *Hydrolab* to depths as great as 200 feet for one hour. By studying the reef environment from the shoreline to a depth of at least 250 feet, scientists attempted to learn early warning systems or prediction mechanisms to monitor the reef environment. Next month, we'll provide you with specific findings made during SCORE.



## DIVER SAFETY

The safety and health of commercial divers in the United States is now being studied by the National Institute for Occupational Safety and Health (NIOSH). According to *Ocean Science News*, the need for the study has been brought about by the fact that the lives of commercial divers are "newly endangered by deeper operations as part of the effort to supply this country with oil and gas." Included in the study will be an examination of the health of Gulf of Mexico divers, development of safe decompression tables for commercial use to 1000 feet, and a closer look at osteonecrosis (bone disease). The NIOSH group will develop a "National Plan for the Safety and Health of Divers." The Undersea Medical Society, Inc., and Marine Technology Society will develop the plan, while a 15-member Diving Task Force will oversee the progress.

## SYSTEMS TESTED

In May testing began on the MK XIV and MK XII diving systems at the Navy Experimental Diving Unit's new Ocean Simulation Facility in Panama City, Fla. The unmanned pressure testing of the MK XIV push/pull saturation diving system was completed in March and a 1000 ft. saturation dive is planned for October, 1975. The MK XIV is used with a personnel transfer capsule (PTC), pumping the PTC atmosphere out to the diver through a 250 ft. umbilical and pulling the used breathing mixture back to the PTC CO<sub>2</sub> scrubber. The MK XII system will eventually replace the MK V brass hat deep-sea dive system that has been essentially the same for 50 years. It is much lighter than the old version. According to *Ocean Science News*, NEDU also plans to develop a neutrally buoyant helmet that could "even be worn by a scuba diver."

## DIVE SOBER!

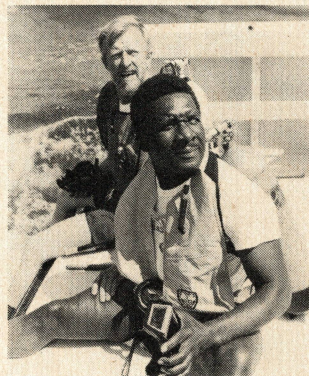
Aseptic bone necrosis, simply described as bone rot without infection, is a disease that occurs in persons exposed to pressurized environments. It has been the subject of study by various diving medics, and the Naval Submarine Medical Research Lab in Groton, Conn., is now issuing reports of surveys on the subject. The first status report issued by the Lab indicates that the disease occurs more often where diving procedures are not standardized, as is the case with Japanese shell divers who suffer the highest percentage of incidences. U.S. and Royal Navy divers, who use standardized procedures, have the lowest incidences. Thus the survey concludes that the inadequate execution of a dive could be directly related to the occurrence of dysbaric osteonecrosis. Another precautionary rule suggested in the survey is to "dive sober." As reported in Navy's *Faceplate*, "Heavy, regular use of alcohol can in itself cause the problem without the added stress of a dive."

## VAT GOES UNDER

Reader Marlene Daniels wrote to us of an interesting project going on in a Wisconsin Lake. It seems a Green Bay, Wisconsin entrepreneur purchased a 1200 lb., 800 gallon steel tank for brewing apple juice, sugar and yeast into a monster batch of wine and then learned about the Government's 200-gallon limit on such concoctions. He then donated the tank to the U. of Wisconsin's program of U/W research and it is now being used as the central chamber of a year-round under-ice habitat. Anchored at 30 feet in Lake Mendota, the station is being used by scientists for research and testing of new equipment such as heated wet suits and artificial gills. Professor Ali Serieg heads the research projects.

## PINDLING ON SCORE

The Prime Minister of the Bahamas, the Hon. Lynden O. Pindling, recently made a dive to inspect the facilities installed by researchers engaged in Project SCORE. Pindling visited *Subigloo*, stationed on the edge of the continental shelf in 90 ft. of water, and the *Perry Hydro-lab*, permanently stationed off Freeport in 60 ft. of wa-



ter. Pindling, an avid scuba diver, also visited the surface support ship *R/V Johnson*, anchored near the habitats. Accompanying Pindling on his inspection dive was Dick Birch (background, left) of Small Hope Bay Lodge in Andros. (Photo by Roland Rose.)

## 27-YEAR-OLD DRIFT

In March a barnacle-encrusted brandy bottle washed up on a beach in Reedsport, Oregon. A couple found it and uncorked a yellowed note inside that said that it had been dropped from the *SS Linfield Victory* off Hokkaido, Japan, on March 6, 1948. Oceanographers say it normally takes a year or two for objects to ride the currents from Japan to the Northwest.

## WHALE ACCENTS

Humpback whales apparently have accents that are similar to human nasal twangs, drawls and other speech patterns. According to a *National Wildlife* report, U. of Rhode Island oceanographer Howard Winn says that whales sing with regional dialects. Whales around

Puerto Rico, for example, have accents quite different from the whales near the Bahamas or the Virgin Islands. Winn adds that the species from the various regions have no trouble communicating with each other.

## ODDS & ENDS

A *Guide to Polar Diving*, by Wallace T. Jenkins, is a compilation of US Navy and civilian experiences in swimming under Arctic ice. It is the only such general guide to polar diving available and has been printed in limited quantities. Write: Gov. Printing Office, Wash. D.C., 20402. Stock no. of the manual is 0846-00072 . . . Because of the 1971 law protecting the sperm whale, General Motors is having trouble with transmissions on their cars. Without the oil, the solder on the transmission fittings have corroded, allowing antifreeze to leak into the transmissions. Result: a \$2.2 million repair bill for GM . . . NASA says that water hyacinths (well known for fouling of waterways) can be used as a final filtration system for removing nitrate, phosphates and other chemical pollutants from sewage . . . Last March Jacksonville (Fla.) Marine Institute graduated their first women, five girls who were part of a pilot project supported by the Division of Youth Services . . . A Canadian scuba diver on Grand Manan Island, New Brunswick, is using a minisub he built with friends, plus financial backing from the Natl. Museum of Canada to search for old shipwrecks in the Bay of Fundy . . . Divers from Tacoma and Seattle recently competed in continuous U/W Monopoly games during Seattle's "Adventure '76" show as part of a March of Dimes drive in that city. Outside viewers could toss in coins while divers battled each other for Boardwalk and Marvin Gardens.





# Drug Abuse and Diving

**D**rugs and diving have been the subject of several letters and editorials appearing between the covers of SKIN DIVER during the past two years. The message has been presented that diving under the influence of drugs is senseless and extremely risky. Notwithstanding this sound advice, the great majority of divers reading these editorials are not "speed freaks" or "pot heads" and may tend to ignore these warnings as being directed at someone else. However, the facts are that most well-trained, safety-conscious divers do abuse drugs while diving as a matter of routine. Alcohol, sea sickness pills, antihistamines, bronchodilators, and headache remedies are all drugs which are often taken by divers, and they could effect diving safety in any number of ways.

Most of the concern with regard to drugs and diving has been focused around psychotogenic drugs, for example, marijuana, mescaline, LSD, or amphetamines, due to their widespread availability and their potential for abuse. From the grapevine we hear tales of the diver who saw "really fan-



By J. MICHAEL WALSH, PH.D.

Behavioral Sciences Department  
Naval Medical Research Institute

tastic things" while diving "stoned." There appears to be strong subjective evidence that psychogenic type drugs are especially dangerous for the scuba diver. Examples of illegal drug-use get great publicity and arouse much concern, but divers should also be aware that prescription and "over-the-counter" drugs may be equally hazardous to safe diving. What might amaze many experienced divers is the grim reality that very few medical facts are known about the toxicity and pharmacological action of almost all drugs under increased pressure. In other words, there is no guarantee that a drug normally taken under surface conditions will act in the same manner when diving underwater.

The following paragraphs will present a summary of what we know about drugs and diving. Rather than threaten the diver with generalities about the "horror" of drugs or preach about what is right or wrong, the purpose of this article is to make the diver aware of the risks involved in diving while taking drugs.

Since most divers are not students of pharmacology, I'd like to start this education on hyperbaric medicine by discussing a few basic facts about drugs that may not be well known by the diving population.

Fact 1. Any chemical substance that affects a biological system can be considered a drug.

Fact 2. Nearly all drugs have multiple actions. The observed drug effect is a composite of a variety of effects on different biological systems (e.g.: the respiratory, cardiovascular, and central nervous system).

Fact 3. A large number of variables alter the effects of drugs (e.g.: age, sex, weight, tolerance-predisposition, and environmental factors). This lends a tremendous amount of biological variation in drug response, so much so that the effect of a drug is never identical in all individuals or even in the same individual on different occasions. Combinations of these factors may quantitatively alter the effect of a drug so as to prohibit its use. For example, the airlines for years have limited passengers to two drinks due to the increased effects of alcohol at high altitude.

Fact 4. No drug is free of toxic effects. Generally these effects are minimal, however, depending on environmental factors they can be serious and sometimes fatal. Behavioral toxicity is an important factor to be aware of in diving. The term "behavioral toxicity" refers to the effects of drugs that result in mood changes, modulation of normal anxiety levels, and impairment of decision-

*(Continued on Page 86)*

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# SDM'S National Scuba Exam

## What's your Diving Emergencies I.Q.?

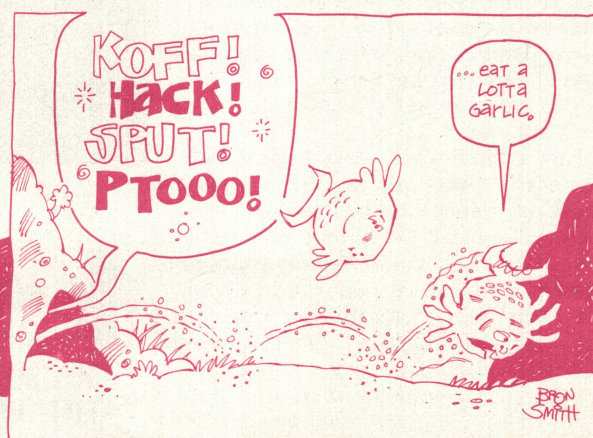
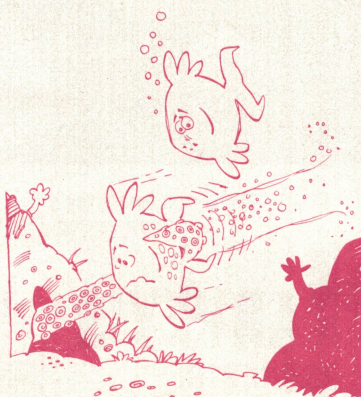
### Answers from questions on page 19.

- 1) B. Baking soda and meat tenderizer, while not standard first aid kit items, are useful in treating the sting of jellyfish. Incidentally, the other choices of more common items are also useful in your diving first aid kit.
- 2) A. Direct pressure over the wound with a sterile pad, a clean handkerchief, or even your hand if nothing else is available, is the recommended procedure to control most cases of bleeding.
- 3) C. Your immediate concern is to get oxygen into the non-breathing diver. Mouth-to-mouth resuscitation can be administered in the water. You may be able to revive the victim on the spot with no need to transport while resuscitating.
- 4) B. Water taken into the lungs causes an inflammatory reaction and would cause the revived victim to drown in his own body fluids. This is referred to as "Secondary Drowning." A drowning victim must receive medical attention and observation regardless of their appearance or what they say.
- 5) B. In any diving emergency account for the victim's buddy. Send others to do this if available. Double accidents are not rare in diving, so be prepared for double rescues.
- 6) B. Vomitus forced back into a victim's lungs will cause serious problems. Roll the victim over, clear away all vomitus in a scooping motion with your fingers, and continue resuscitation. This may not be pleasant, but it is necessary to save a life.
- 7) C. All are symptoms of shock. Always treat for shock in any serious accident.
- 8) B. When treating for shock, do not heat a person. Instead, maintain their normal body temperature. On a hot day, it will be necessary to remove a diver's wet suit, rather than covering the diver with a blanket.
- 9) C. The carotid artery runs alongside the neck. Learn to locate it to detect a pulse. It is difficult to detect a pulse on a cold and wet diver, but this is the preferred location.
- 10) A. If a radio is available, contact the Coast Guard first. The emergency frequencies are 2182 KHZ or 156.8 MHZ. The Coast Guard may be able to supply a helicopter and obtain other emergency facilities for treatment.
- 11) A. By reducing alveolar partial pressures, the breathing of oxygen can actually reduce bubbles in the circulatory path. Some dramatic recoveries have been made when oxygen has been administered in serious diving accidents.
- 12) B. In-water recompression is not feasible and will very likely worsen the condition. Discourage any such attempts and seek recompression at the nearest facility.
- 13) A. Always seek medical assistance and recompression for an unconscious diver unless the cause is known not to be diving related, e.g., hitting the head.
- 14) C. You will need to get the person onto a firm surface to administer cardio-pulmonary resuscitation, since there is no method to apply CPR in the water. Resuscitation will be of no value if the heart has stopped circulating the blood.
- 15) C. There are several reasons for this position — treatment for shock; increased blood pressure on the brain for treatment of embolism; it aids in removing any vomitus should vomiting occur.

Regardless of your score, you will probably agree additional training would better prepare you for diving emergencies. Training in first aid, lifesaving, and cardio-pulmonary resuscitation is almost a necessity for divers. If you missed more than 3-4 questions, consider enrolling in some local courses, and talk your buddy into going along. Next month's SDM National Scuba Exam will feature Boat Diving Safety.

## FISHTALES

BY BRON SMITH

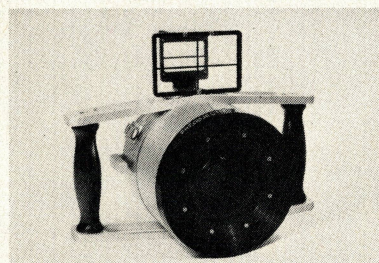




Seahawk Press is offering a new, full color sea poster map entitled, "Grand Cayman Underwater Guide." This beautiful reproduction is 19 by 25 inches and is printed on heavy poster stock. It can be purchased from your local dive shop for about \$2.50 or can be ordered direct from the publisher, with five other posters, for \$15.00. Seahawk Press, 6840 SW 92nd St., Miami, Florida 33156.



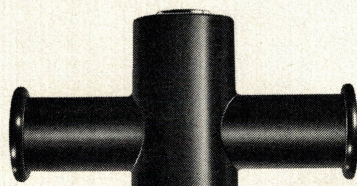
ALPA, the creator of the original SLR camera, has developed the Underwater Dream 1975 Camera. It is the only U/W camera with a between-the-lens shutter having x-contact sync for strobe flash up to 1/300 of a second. The camera has a heat repellent, bright anodized finish, and comes with a 35mm lens, f2.8. The camera features automatic aperture control, fully automatic electric drive operation and much more. Price: \$995. Rebikoff Inst., 3060 SW 4th Ave., Ft. Lauderdale, Fla. 33315.



A new housing for the Bronica S2A camera has been added to the Ikelite U/W photo system, complete with controls for all camera functions, removable view finder and handle assemblies, and provision for optional flash units. Optional flat and dome ports are available for the 50mm lens. The price is: \$295. Ikelite Underwater Systems, P.O. Box 88100, Indianapolis, Ind. 46208.



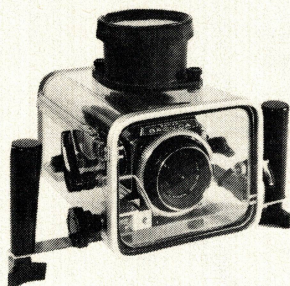
This versatile carrying case is perfect for easy handling of dive instruments and other delicate items. The MTO-51 meets air transport standards, measures 29x20x9 inches and weighs 9½ pounds. It is made of high impact, injection molded ABS plastic and has polyurethane cushioning inside. \$66. Available without cushioning for \$55.50. Melmat, Inc., 2909 Oregon Court, Torrance, California 90503.



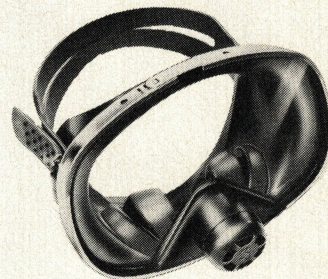
This one-piece plastic adapter from Glenn Beall allows you to fill your inner tube flag float directly from your scuba tank; it also facilitates draining the air from the float for easy carrying by screwing the one end onto the valve stem. It also allows you to seal the valve stem against dust, moisture and leakage, or to remove the valve stem for repairs. \$4. Glenn Beall Industries, 1080 N. Ferndale, Gurnee, IL 60031.



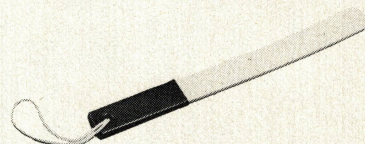
## New Gear



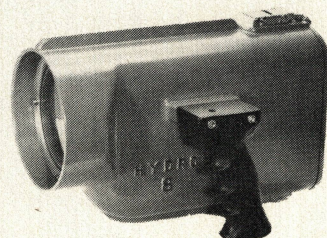
The Super Pro-Vision Mask constructed with a new elongated rectangular shape which significantly increases the normal field of vision. Constructed with a special jet-black compound, this mask features the "Big Nose" purge valve. It also features finger wells plus an extremely comfortable seal. The price is: \$15. Available from: Scubapro, 3105 East Harcourt, Compton, Calif. 90221.



Healthways has a new abalone iron, the Scubamaster Ab and Divers Tool. This unbendable ab iron is made of ¼-inch 606L-T6 aircraft aluminum alloy. The lanyard, not shown, is made of a heavy rubber compound which adjusts to your wrist. A bonded, soft vinyl handle, and an inch marked scale for measuring gape, highlights the tool. It meets the 1975 Calif. Fish and Game requirements. \$9.95. Healthways, 5340 W. 102 Street, Los Angeles, California.



The Hydro 8 by Oceanic Products houses any number of super 8 cameras (dimensions not exceeding 3" wide, 5½" high, 9½" long). The Hydro 8 housing is constructed of cast aluminum with a large round front port that allows even extreme 7.5mm wide angle shots without corner cutoff. Optional focus and zoom controls, and rear eyepiece module. \$139.50. From: Oceanic Products, Inc., 814 Castro Street, San Leandro, California 94544.





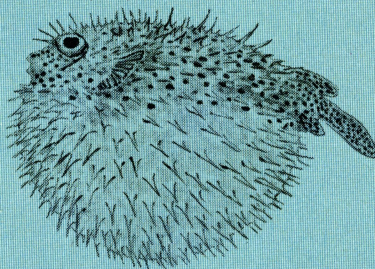




## The Porcupinefish

*Diodon hystrix*

Porcupinefishes are well-known oddballs of the sea. These round, inflatable pincushions are familiar even to non-divers since they are widely seen around the world in curio shops—inflated, varnished and hung by a string. Alive and underwater these fishes are much more entertaining. When they're relaxed they appear like any other streamlined fish, the spines lying flat against their sides. However, at any sign of danger they can greatly inflate themselves by inhaling water into their abdomen. With this ballooning action the sharp spines protrude straight out from the body, transforming what formerly appeared to be a normal fish into a ball-shaped pincushion. This is a reasonably sure defense against predators that have little interest in chewing on needle-like quills. □ The porcupinefish is a member of the Diodontidae family of porcupinefishes (*Diodon*) and burrfishes (*Chilomycterus*). The major difference between the two is that the spines of the porcupinefishes are two-rooted and can lie flat, while those of the burrfishes are three-rooted and rigidly erect all the time. □ In the Caribbean there are two main Diodons — the porcupinefish (*Diodon hystrix*) and the spiny puffer (*D. holacanthus*). They are very similar in that they both possess long spines, scattered black spots, and rather large eyes. However, there are differences. The porcupinefish has only the smaller black spots while the spiny puffer also has large dark blotches. The porcupinefish is a larger species, reportedly reaching three feet while the spiny puffer grows to less than 20 inches. Very often the spiny puffer will have brown blotches and bands on



Inflated state

its body. On the porcupinefish the dorsal area is greenish, shading to a near-white in the ventral region. □ The porcupinefish is not seen as often as the spiny puffer, but it is relatively common where found. It occurs around the world in tropical waters and in a variety of habitats. Ichthyologists James Bohlke and Charles Chaplin have recorded them in mangrove-lined tidal areas, on small patch reefs, and in shallow, sluggish canals. In the West Atlantic the porcupinefish is found from New England (Massachusetts) to south-

eastern Brazil, including the Bahamas and Gulf of Mexico. They are shallow water fishes and will very often be seen at depths around 20 feet. Studies conducted by Dr. John Randall have revealed that porcupinefishes feed on mollusks, sea urchins, crabs and hermit crabs, especially preferring gas-

tropods. The powerful beak-like jaws of the fish are well suited for crunching through the hard shells of invertebrates which are normally unpalatable to other fishes. □ The porcupinefish is a poor swimmer and is not capable of moving quickly. If the fish become cornered the diver can probably get it to inflate. The fish has never been commercially useful to man and has been known to cause ciguatera, or fish poisoning. Outside the curio business the biggest exploitation of the porcupinefish may well have been at the time when certain Pacific islanders used their dried skins to make war helmets. Today, porcupinefishes are often caught in fish nets by accident, but this is only regarded as a nuisance to fishermen who find that untangling a ball of quills from a net can be a near-impossible task. >>>

*Photo By Carl Roessler—Text By Hillary Hauser*

Photo taken in 35 feet of water off Bonaire in the Caribbean. Photographer Roessler used a Nikon F camera with a 55mm lens, a Bauer strobe, Kodachrome II, 1/60 sec. at f8, two feet from subject.





# THE POISONED SEA

Photograph by Author

By DR. LEE TEPLY

On a cold grey December morning Jim Dallas and I pushed his fiberglass runabout down a concrete ramp into dark water. Jim seemed very quiet as he mounted a small eight hp outboard motor. He had been enthusiastic when we planned the dive the night before, but on this cold dismal morning he seemed to be having second thoughts. I tried to be cheerful to cover my own lack of enthusiasm. The two of us would soon be starting on a long slow boat ride — first about two miles along the inside of the Los Angeles Harbor breakwater and then at least four miles in the open sea along the Palos Verdes coastline. We hoped to dive in 60 to 180 feet of water and film a barren bottom caused by sewage pollution.

We loaded our diving and camera gear into the boat, fired up the motor and shoved off. An hour later our boat rounded the end of the breakwater and entered the open sea. The air was still cold and the smoggy sky was a dismal grey, but the ocean was almost flat — calmer than I had seen it in the many dives I had made at Palos Verdes during the past year.

In earlier dives I had often entered the sea with my camera from the shore — for some of the more striking results of sewage pollution at Palos Verdes are found in very shallow water. I had also made a number of boat dives to film pollution damage farther from shore. My purpose was to document an appalling case of undersea sewage pollution which few peo-

ple seemed to be aware of or even care about. I was now in the process of producing a film, *The Poisoned Sea*, which I hoped would publicize the problem and help lead to its correction.

As our boat moved slowly up the Palos Verdes coastline, Jim Dallas remained quiet. I could understand his lack of enthusiasm. It is one thing to express interest in undersea conservation — but something entirely different to really show that interest by taking a slow tedious boat ride on a grey dismal day to dive in a polluted and poisoned sea.

Perhaps Jim and I would have been more cheerful if we could have predicted that today's filming would provide the most damning footage that I would obtain of undersea pollution at Palos Verdes, and that this footage would serve as a dramatic high point of the film. As our boat crept up the coast, my mind went back to the very different and very beautiful Palos Verdes where I learned to dive over 20 years ago.

While a graduate student at UCLA in 1950, I had heard of the wonders of the undersea world and decided to take a look for myself. Using only fins, face mask, and snorkel, and wearing only swim trunks, I first ventured into the ocean in the calm clear waters of Lunada Bay near the northwest corner of the Palos Verdes Peninsula. I swam slowly along the surface and stared in fascination at the everchanging panorama below. Sunlight flashed from multi-colored seaweeds swaying in a



gentle surge. Orange garibaldi swam slowly among the rocks and sometimes came up to stare at me. Red and purple sea urchins and starfish of many colors contributed their bit to a picture more brilliant than anything I would ever remember seeing above water. For a while I was almost oblivious to the biting cold, but I still recall how my skin turned blue when, shaking violently, I left the water.

Two weeks later I re-entered the waters of Lunada Bay wearing one of the first rubber dry suits manufactured in Los Angeles and perhaps in the world. It was seldom actually dry (Sometimes it seemed to leak like a sieve.) — but it provided enough protection against the cold water so that I was able to enjoy for hours at a time the new underwater world that was opening up before me. During the next seven years my buddies and I explored diving spots all along the southern California coastline. We spent most of our time at Palos Verdes which was close, convenient, and provided superb diving.

The Palos Verdes Peninsula contains over 20 miles of winding rocky coastline. Many of the coves were easily accessible by pathways leading down the sides of almost sheer cliffs. The hike down the cliffs added to the excitement of the dives — for even in the early 1950's it seemed remarkable that such a strange and beautiful undersea world could exist seemingly undisturbed by man at the edge of a large city like Los Angeles.

At that time magnificent forests of giant *Macrocystis* kelp still dominated a large part of the Palos Verdes coastline. Swimming through the kelp forests was a unique and indescribable experience. Sunlight passing through openings in the kelp canopy moved downward in a series of ever moving shafts illuminating the kelp and the diverse flora and fauna on the ocean bottom. I did not know that the giant kelp provided the framework for most of the varied marine life that lived in the waters of Palos Verdes; nor did I realize that many of the kelp beds at Palos Verdes had already disappeared.

I recall only one diving spot at Palos Verdes which did not require a hike down a cliff. This was White's Point near the southeast end of the peninsula. We could park our cars almost at the water's edge and easily enter the sea. Yet we rarely dived at White's Point because there was very little kelp in the area, the water was often dirty, and I had been told that there was a sewage outfall somewhere offshore. I did not associate the absence of the giant kelp and the proximity of the outfall. I was not interested. Unfortunately, almost no one else was interested either. As the years went by the rate of sewage discharge increased until the White's Point outfall, operated by Los Angeles County, became the largest ocean outfall in the world and the ocean bottom at Palos Verdes turned into a desolate marine wasteland.

In 1957 I completed my graduate work at UCLA and moved away from Los Angeles. Five years later I became deeply involved in underwater filming. Although I dived and filmed in many parts of the world, I did not return to Palos Verdes until 1972 when I began work on *The Poisoned Sea*.

I had heard that sewage nutrients in the waters of Palos Verdes stimulated violent population explosions of spiny sea urchins. The urchins had supposedly eaten away all of the kelp beds and had turned the ocean bottom into a desolate marine wasteland. It was a story that I thought might provide the basis for a film on ocean pollution in California waters.

Early in 1972 I loaded my car with camera gear, drove to Los Angeles, and dived again at Palos Verdes for the first time in over 15 years. Although I had a good idea of what to expect, it still turned out to be an appalling homecoming. In the next one and a half years I dived and filmed many times in the waters of Palos Verdes. I studied the scientific literature on the problems of pollution in these waters. I discussed these problems with a number of marine biologists who had worked in the area.

Of particular help to me were Dr. Rimmon Fay of the Pacific Bio-Marine Laboratories, Dr. Wheeler North of the California Institute of Technology, and Dr. John Pearse (previously a

co-worker of Dr. North) of the University of California at Santa Cruz. Drs. Fay, North, and Pearse all agreed to be scientific consultants for *The Poisoned Sea*. I found their opinions sometimes differed radically. I began to realize that the causes of undersea pollution at Palos Verdes were many and complex. Some facts, however, soon became quite clear: 1. The beds of giant *Macrocystis* kelp were gone from Palos Verdes along with most of the rich and diverse marine life that the kelp beds had supported. 2. The shallow waters along the Palos Verdes coastline were dominated by hoards of sea urchins. 3. At depths greater than 20 feet a thin layer of sediment was found on the rock outcroppings. With increasing depth the sediment layer became thicker. Also with increasing depth the ocean bottom became more desolate. 4. Few animals were found in the deeper waters. Even sea urchins — so common in shallow waters — were rare at depths below 25 feet and almost never found deeper than 30 feet. But what did these facts mean?

Dr. Wheeler North presented his ideas on the large populations of sea urchins found in the shallow waters, and on their relation to sewage. Dr. North believes that sea urchins ordinarily live in a rather unstable equilibrium with the giant kelp. They feed mostly on broken bits of kelp and other seaweed which rain down upon them. Sometimes, for reasons unknown, the urchins undergo violent population explosions. When this occurs drifting seaweed no longer provides enough food and the urchins become hungry and graze actively. One of their favorite foods is the giant kelp. The grazing urchins climb onto the kelp holdfast and eat through the plant. The plant breaks loose and floats away.

After most of the giant kelp has broken loose, the urchins graze on other seaweeds. In some areas urchins die of starvation after clearing an area of seaweed. Then the giant kelp returns. Thus a natural ecological cycle seems to occur starting with a sea urchin population explosion followed by a kelp die-off. Then the sea urchins starve. Finally the giant kelp returns and the cycle is complete. Dr. North believes that a natural cycle of this type started at Palos Verdes in the 1940's. However, the cycle was never completed because, although most of the sea urchins are small and half starved, they are still active enough to prevent seaweed from taking hold. How do they survive? Dr. North believes they survive on dissolved organics from sewage, for the Los Angeles County sewage outfall at the southeast end of Palos Verdes has now grown to be the largest ocean outfall in the world.

On the other hand, Dr. Rim Fay doubts that sewage is of any importance in keeping the urchins alive. He believes that bits of drifting seaweed and slow sparse algal growth are adequate to keep the urchins from dying of starvation.

Whether or not they survive on sewage, there is no question that sea urchins dominate the shallow waters of Palos Verdes. But what about the deeper waters? Moving out from the shore at White's Point the diver typically finds that the urchin population becomes less dense with increasing depth. The animals remaining in about 20 ft. of water are mostly large and appear well fed. There is little seaweed at this depth and Dr. North suspects that the large urchins may be grazing on a layer of fine organically rich sediment which covers the bottom.

At about 25 feet a few large urchins are sometimes found on the tops of barren rocks where the sediment layer is only a few millimeters thick. They are not found in the heavier sediment between the rocks. At depths greater than 30 feet there are no sea urchins. Apparently they can tolerate and perhaps even thrive on a thin layer of the organic sediment. Clearly, however, they did not survive in the heavy layer. Neither did the giant kelp grow in the environment dominated by sediment.

What is the source of this sediment layer at Palos Verdes in which so little marine life is found? Dr. Fay has long been convinced that the sediment consists largely of particulate matter which drifted in from the ends of the sewage outfalls one and a half — two miles offshore.



I found evidence supporting Dr. Fay's opinion in a paper by Dr. Richard Grigg and Robert Kiwala entitled "Some Ecological Effects of Discharged Wastes on Marine Life" (California Fish and Game, 56 (3): 145-155, 1970). The paper described results obtained by the authors at Palos Verdes in 1969. They repeated and extended work conducted by Conrad Limbaugh in 1954. Limbaugh had found deterioration of marine life along a distance of  $\frac{3}{4}$  to two miles of coastline which he attributed to sewage from the Los Angeles County outfall. Fifteen years later Grigg and Kiwala established that at depths of 45 to 65 feet the organic rich sediments had become thicker and the damage to marine life had spread to a distance of about six miles of coastline. Many species of plant and animal life had either disappeared or had become extremely rare. The deterioration of the environment was found to be directly correlated with the spread of the organic rich sediments from the outfall. Here then were hard data spanning a 15-year period and documenting the damage caused by a blanket of organic rich sediments at depths only slightly greater than where I had been filming.

The sediment layer is probably capable of smothering some marine life forms by depriving them of much needed oxygen. Dr. Grigg (who agreed to be a scientific consultant for *The Poisoned Sea*) pointed out to me that the sediment layer was responsible for the alteration of almost all suitable substrates where the larval and juvenile stages of many marine animals and plants might settle and grow. Industrial wastes — such as metals, pesticides like DDT, chemicals like the PCB's, etc. — contribute a high degree of toxicity to the sludge. The results of Grigg and Kiwala strongly suggest that the sediment buildup caused — or at least contributed to — the kelp die-off and the overall desolation of the ocean bottom in the deeper waters.

But does the organically rich sediment all come directly from the sewage outfall pipes? The Ph. D. thesis of Edward P. Myers at Cal Tech suggests another contributing factor. The heavy nutrient content of the sewage is known to stimulate plankton blooms even at considerable distances from the outfall. Dr. Myers suspects that some of the planktonic material may settle to the bottom and add to the sediment content. Planktonic material in the sediment is not easily distinguishable from organic sewage particulates, and, hereafter, the combination of the two will be referred to as sewage sludge.

In summary, destruction of marine life at Palos Verdes appears to result from the following:

In the shallow waters most of the damage seems to have been caused by hoards of sea urchins which grazed away the giant kelp. Marine life forms dependent on the giant kelp then disappeared. Dr. North believes that sewage sludge is not a serious problem in the shallow waters because it is usually kept off the bottom by wave surge.

In the deeper waters the following two possibilities seem most likely: 1. As in the shallow waters, hungry sea urchins grazed away all of the giant kelp. At a later date the area was overwhelmed by sewage sludge which added to the desolation and prevented re-establishment of the kelp and of most other marine life. 2. Alternatively, the buildup of the sludge blanket destroyed potential habitats for juvenile kelp plants and for the larval and juvenile stages of many other marine life forms — including sea urchins. Toxins in the sludge may have also contributed to creating an environment in which most marine life could not survive.

Many other factors may have also contributed to the destruction. For example: 1. Increased water turbidity caused by suspended sewage particulates and planktonic material resulted in reduced light penetration—particularly in deeper waters near the outfall pipes. Since giant kelp requires light for photosynthesis, its growth in the turbid waters would be greatly inhibited. 2. Once the kelp beds had been thinned out—whether by sea urchins, sewage sludge, or both—herbivorous fish migrating through the area would have found themselves hard-pressed for food and may have grazed heavily on the remaining kelp plants, hastening their demise.

It seems to me that the sludge problem was likely to be by far

the most serious. Even if all of the sea urchins at Palos Verdes were to miraculously disappear, the sludge blanket would still prevent the return of most of the kelp and its dependent marine life. It has been estimated, in fact, that 95% of the kelp at Palos Verdes once grew in areas now affected by sludge.

I was intrigued by a series of kelp bed maps found in several of Dr. North's Cal Tech reports. Reproduced from historical data, some of the maps showed the locations of the kelp beds at Palos Verdes before the existence of the Los Angeles County sewage outfall. Other maps showed, in time sequence, the gradual disappearance of the kelp beds as the sewage discharge rate from the outfall increased.

A 1928 map of Palos Verdes showed almost three square miles of kelp beds. Near White's Point the beds were particularly extensive. In 1934 the outfall first went into operation. By 1947 sewage was being discharged at the rate of 59 million gallons per day and the total kelp bed area had decreased to about one square mile. By 1955 the sewage discharge rate had grown by another factor of three; the total kelp bed area was down to about  $\frac{1}{4}$  square mile and there was no kelp left at White's Point. By 1968 the discharge rate reached 348 million gallons per day and the last of the giant kelp at Palos Verdes disappeared. At the present time sewage is being discharged from the Los Angeles County outfall at the rate of nearly 400 million gallons per day.

The maps clearly showed that the giant kelp tended to thin out and disappear first near the outfall and then further away. The kelp die-off may have been caused by the grazing of hungry sea urchins, turbidity, sewage sludge, or a combination of all three. In any case, the basic cause of the die-off was sewage from the Los Angeles County outfall.

The maps also showed that before the warm water years — 1957 to 1959 — over 95% of the kelp had already disappeared from Palos Verdes. This was of special interest to me because I had been told many times — by obviously misinformed individuals — that the warm water was the main cause of the kelp die-off. Clearly, the warm water was only a secondary factor.

As my research and filming at Palos Verdes continued, I became convinced that the blanket of sewage sludge was the main cause of desolation of the ocean bottom near the sewage outfall — but why was the ocean bottom so desolate as far away as Lunada Bay about eight miles from the end of the nearest pipe? How far did the sludge blanket really extend? I found what appeared to be the answer in the Ph. D. thesis of Dr. James Galloway of the University of California at San Diego. Dr. Galloway had taken core samples over a broad area along the Palos Verdes coastline. He measured abnormally high concentrations of copper, chromium, cadmium, zinc, and lead centered around the sewage outfall pipes and extending along the coastline for about ten miles. Dr. Galloway pointed out that all five of these metals attach themselves to solid organic matter in the sewage. Thus, I believed that the maps in Dr. Galloway's thesis which gave the locations of the metals, also gave the approximate location of the blanket of sewage sludge along the Palos Verdes coastline. I discussed this point with Dr. Galloway by telephone. He agreed and consented to become one of the scientific consultants for *The Poisoned Sea*. The sludge blanket, then, appeared to extend about ten miles along the Palos Verdes coastline from the Los Angeles Harbor breakwater to Point Vicente. Containing metals, pesticides like DDT, chemicals like the PCB's and many other industrial wastes, the sludge blanket covered an area of approximately 40 square miles.

But if the sludge blanket only extended to Point Vicente, why was the entire Palos Verdes coastline desolate? I had observed that near the north end of the peninsula — farthest from the sewage outfall — the ocean bottom was in better shape than near White's Point. At Haggerty's Cove, for instance, red coralline algae still survived and a few garibaldi were to be seen. But even Haggerty's Cove was desolate compared to its appearance 20 years ago when I first dived the area. I found it hard to believe that sewage sludge could directly affect the marine environment as far from the outfall as



Haggerty's Cove. I felt that many years would pass before all of the details relating to the desolation at Palos Verdes would be fully understood. I also felt, however, that after almost a year's research I understood the problems well enough to place the main factors in perspective. The time had come for me to stop filming and start on the production of *The Poisoned Sea*.

While writing the script I realized that I had neglected one important sequence. I have not actually filmed — or even dived — in the deeper waters where the heaviest part of the sludge blanket would be found.

This then was the purpose of today's dive — to film the sewage sludge and its effects on marine life in the deeper waters of Palos Verdes. About two hours after our boat left the pier inside the Los Angeles Harbor breakwater, I threw anchor at about a 60 foot depth off Pt. Fermin. I could see the anchor rope down to 40 feet. This was by far the best visibility I had encountered at Palos Verdes in the past year. I realized that with visibility like this, we might even be able to dive and film close to the end of the sewage outfall. We pulled anchor and headed toward White's Point.

About one mile offshore we threw anchor and dived. Visibility was still good. The bottom was 100 ft. down. It was almost flat and barren. There were many rocky outcroppings. Between the rocks was a fine sediment that responded to even a gentle touch by turning into a billowing black cloud. This was like no sediment I had ever seen before. I was confident that it was pure sewage sludge — if sewage sludge can be considered pure. Here was a graphic example of the sludge blanket which I had discussed with many marine biologists but which I had never been able to really visualize. It was just what I needed to give impact to *The Poisoned Sea*.

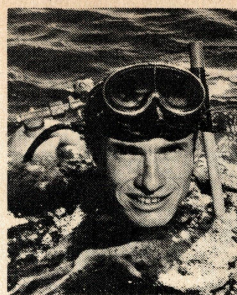
As Jim Dallas and I swam along the sludge covered bottom we encountered skeletons of many gorgonian sea fans on rocky outcroppings. The gorgonian is a soft coral which seems to have an extremely high tolerance to sewage, but here in 100 feet of water at White's Point most of the gorgonians were dead. The sludge blanket extended along the bottom further than we could see. After the dive Jim told me that he had stuck his hand down into the sewage almost up to his elbow, a distance of 12 to 18 inches.

Once aboard the boat I found I had lost all desire to dive closer to the end of the outfall. Jim commented that it had been the most sickening dive he had ever made. We agreed, however, to make several more dives in shallower water to get some idea of the extent and uniformity of the sludge blanket. Our next dive was closer to shore at 90 ft. depth. I filmed Jim sticking his hand six inches down through the sewage. Again the sludge blanket, although not as thick as at 100 feet, seemed uniform and homogeneous as we swam along the bottom. After the second dive Jim announced that he could take no more. I made one last 90 foot dive about a half mile down the coast and again found a blanket of sludge six inches thick.

Shortly before sunset we started our long slow boat ride down the Palos Verdes coastline. After sunset Jim and I both became miserably cold. We shivered for several hours as our boat moved slowly along the outside of the breakwater. Despite my discomfort I recall being well satisfied with the day's dive for I had filmed in its most extreme form the "poison" of the *Poisoned Sea*. It was long after dark when our boat finally pulled up to the pier.

I now had all the footage necessary to document the devastation caused by sewage pollution in the waters of Palos Verdes. But *The Poisoned Sea* was meant to be more than an expose. It was intended to be an educational film which — by focusing on a single undersea disaster area — would hopefully stimulate public interest in a much larger problem — the pollution of all of the oceans of the world.

Still I did not want the film to leave the viewer with an impression of impending doom — for the situation is not hopeless, and a large part of *The Poisoned Sea* is devoted to techniques to combat sewage pollution at Palos Verdes. These include importing sea otters to eat sea urchins (only a suggestion), "purping" (killing sea urchins manually), transplanting



Lee Tepley received his Ph. D. in Physics at UCLA in 1957. While at UCLA he became an avid skin diver. He worked in Space Physics at the Lockheed Palo Alto Research Laboratory from 1959 through 1968. During this period he was in charge of several Lockheed projects to measure sounds from outer space at field stations on the Pacific islands of Kauai, Canton Island, and Tongatapu.

While working on the islands he took up underwater filming as a hobby. One of his first films, *The Devilfish of Canton Island*, featured sounds from outer space as background music for the giant Pacific manta ray. In the following years he produced a number of prize winning underwater films which were shown extensively at underwater film festivals.

In 1968 he combined his job and hobby by initiating a project at Lockheed in underwater scientific photography. He is presently continuing this work with Lockheed on a part time basis. However, in recent years his efforts have been largely devoted to studies of undersea pollution on his own initiative. Under the name Moonlight Productions, he has produced two films, *Cloud Over The Coral Reef* and *The Poisoned Sea*, which document the results of these studies. His most recent film *Fire Under The Sea: The Origin of Pillow Lava* documents man's first observations of active lava flows underwater.

the giant kelp, and — by far the most important — employing improved methods of sewage treatment.

*The Poisoned Sea* was completed about one and a half years ago. Not surprisingly, it has been less well received in Los Angeles than in other parts of the world. Nevertheless, in recent years the Los Angeles County Sanitation District has become increasingly aware that the waters of Palos Verdes are badly polluted, and some action has already been taken to alleviate the problem.

For example, from 1949 to 1970 the Montrose Chemical Company, the world's largest producer of DDT, discharged over 600 lbs/year of the pesticide into county sewers. Much of this DDT will remain in the sludge blanket at Palos Verdes for many more years. There is evidence that, moving upward through the food chain, it has damaged both marine and bird life. For example, pelicans at Anacapa Island (about 55 miles from Palos Verdes) faced extinction from inability to reproduce due to fragile eggshells. This has been attributed to uptake of DDT by the pelicans from their fish diet.

Los Angeles County has caused the discharge rate of DDT to be reduced by a factor of about 100, and there are now signs of improvement in both marine and bird life. The pelicans are reproducing again.

The county has also achieved some improvement in the quality of other industrial wastes discharged into the sewers. Also in the near future, a new sewage treatment facility will go into operation and will substantially reduce the amount of sludge discharged into the ocean. There is reason to hope for at least partial recovery of marine life at Palos Verdes.

Still, in order to maintain this hoped-for recovery, improvement in sewage treatment must increase faster than population density and industrialization in Los Angeles County. Hence, the ultimate recovery of Palos Verdes is not assured, but the prospect for improvement is more promising than in many other polluted waters — for in coming years ocean pollution will continue to increase worldwide as the underdeveloped nations become more industrialized and more heavily populated. There is a real and growing danger that all of the world's oceans will soon encounter pollution similar to that found in the *Poisoned Sea* of Palos Verdes. ■



# Summons from SOD!

SOD, "Sage of the Deep", will personally supervise Bonaire's most ambitious four-week "SCUBA-FEST I". Each week a full program has been set up to show you all the exciting beauties of Bonaire's underwater world; to take you to virgin coral reefs or to isolated beaches; to give you seven full days of enjoyment and relaxation! Bonaire's own Cap'n Don of Aquaventure, organizer and host, will leave no stone (because you can't take the coral!) unturned to make you want to come back to Bonaire every year... as do 80% of the divers who have been there before. For "SCUBA-FEST I", a special package has been arranged with Aquaventure, Hotel Bonaire, and Hotel Flamingo Beach Club. It includes your room and food (M.A.P.), transfers, cocktail parties and barbeques, a special beach picnic AND ALL GRATUITIES AND/OR SURCHARGES. For the divers, it also includes a tank, pack, and a tote-box for the entire week, six air fills, six organized reef trips, lectures, and underwater movies!

Entire week pkg. (based on double occupancy p.p.)  
Hotel Bonaire \$ 209.00, Hotel Flamingo Beach Club \$ 191.00  
Entire week pkg. (based on single occupancy p.p.)  
Hotel Bonaire \$ 258.00, Hotel Flamingo Beach Club \$ 201.00

SCUBA portion: \$ 81.00  
(optional extras: airs \$ 2.25  
reef trips \$ 4.50, add 10%  
service charge)

Join the fun and games and all the activities planned especially for Bonaire's month-long "SCUBA-FEST I". Reserve your week right now by writing directly to Hotel Bonaire or Hotel Flamingo Beach Club, Bonaire, Netherlands Antilles, or Lisind International Travel, 5 World Trade Center, N. Y. C.

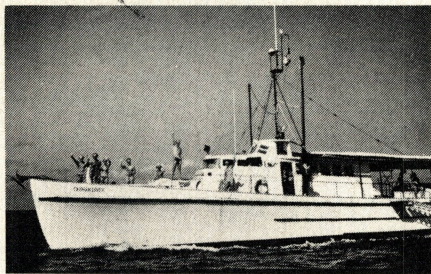


bonaire



## CAYMAN TO ROATAN

See & Sea is pleased to announce its annual *Cayman Diver* diving cruise from Grand Cayman across the Caribbean to Roatan, Republic of Honduras. This adventurous diving program will feature varied diving thrills at Grand Cayman, Little Cayman, Swan Island and Roatan.



Escorting this September 6-18 cruise will be Rick Tegeler, award-winning underwater photographer and photojournalist, whose stories and pictures have appeared in *Oceans*, *Dive* and various other magazines.

Divers will join the 85 ft. *Cayman Diver* at Grand Cayman, with return flights at the end of the cruise from Roatan. This is one of the most adventurous programs offered avid divers in the entire Caribbean, and a special experience for underwater photographers.

For further information contact: See & Sea Travel Service, 680 Beach Street, Suite 340, San Francisco, California 94109.

## KEY LARGO FILM LAB

Key Largo now has a full time color processing lab, catering to the needs of visiting divers. Owned and operated by divers, Sea Color Photo Lab specializes in the processing of film and printing of photos for underwater photography enthusiasts. The most attractive feature is overnight processing of Ektachrome-X and High Speed Ektachrome color slides, so that divers may actually see the results of their efforts before the end of their vacation. Rapid processing of black and white films is also available. All processing work is competitively priced with most custom photo labs around the U.S.



Another special feature of Sea Color Photo Lab is a new and exciting color print process called Cibachromes. Beautiful color prints ranging in size from 5x7 to 20x24 inches can be made directly from any color slide. The quality and appearance of these prints is exceptionally good, and the cost is surprisingly



low. All color prints are made by dark-room personnel who are experienced scuba divers, and know how to bring out the true color balance for undersea photography.

Sea Color Photo Lab is managed by Jim Spencer, an avid underwater photographer and graduate of Brooks Institute of Photography Underwater Photo Course. The lab is a subsidiary of the Coral Reef Park Company, and is located on a small, side road at the entrance to John Pennekamp Coral Reef State Park. The lab conducts business via mail order, as well as serving the visiting Keys diver passing through Key Largo.

For more information and prices, write to: Jim Spencer, Sea Color Photo Lab, P.O. Box 13-M, Key Largo, Florida 33037. If you are planning to visit the Florida Keys, stop by for a tour of the lab facility or call: (305) 451-0930.

## "It's unbelievable. The greatest reefs in the Caribbean are only about 50 yards off the beach."

Divers get very excited about the Caymans.

First, because of our sensational variety of reefs—everything from walls to cliffs to caves to black coral. Second, because a lot of the reefs are so close in you can paddle out from the beach. Third, because for deeper trips, we probably have more experienced diving guides per mile than anyplace else in the world. Fourth, because there are shallow water wrecks abundant with fish and perfect for photography.

And finally, because whether you're looking for a modern, luxurious resort or a quiet little seaside lodge to get away from it all, you'll find it in the Caymans.

**Beach Club Colony**  
Box 903, Grand Cayman, B.W.I.  
**Bob Soto's Lodge & Dive Shop**  
Box 894, Grand Cayman, B.W.I.  
**Buccaneer's Inn**  
Box 68, Cayman Brac, B.W.I.  
**Cayman Kai Resort Ltd.**  
c/o HPI, 1301 W. 22nd St., Ste. 510,  
Oakbrook, Illinois 60521  
**CICO Rent-A-Car System**  
Box 400, Grand Cayman, B.W.I.  
**Spanish Bay Reef**  
Box 800, Grand Cayman, B.W.I.  
**Sunset House**  
Box 479, Grand Cayman, B.W.I.  
**Surfside Water Sports**  
Box 26, Grand Cayman, B.W.I.  
**Tortuga Club, Ltd.**  
Box 2228, Hollywood, Fla. 33022



**Cayman Islands Department  
of Tourism**  
250 Catalonia Ave., Suite 604  
Coral Gables, Florida 33134

Please send me your brochure that  
tells the whole beautiful story about  
the Caymans.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State/Zip \_\_\_\_\_

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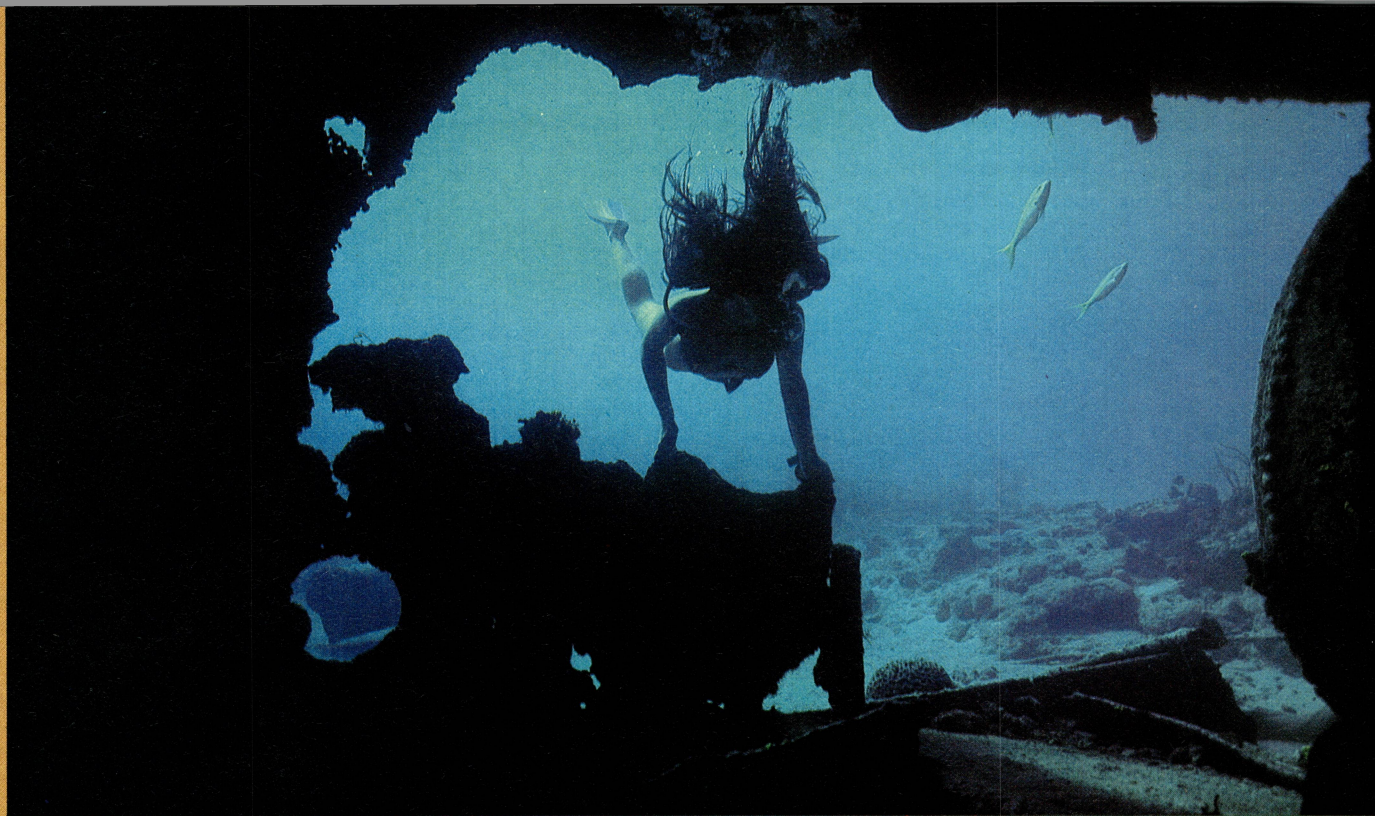
**Cayman Airways Ltd.**  
The National Flag Carrier of the Cayman Islands  
Box 1101, Grand Cayman, B.W.I.





**Southern Airways, Inc.**  
United States Flag Carrier to the Cayman Islands  
Box 1059, Grand Cayman, B.W.I.





# SDM Diving Guide

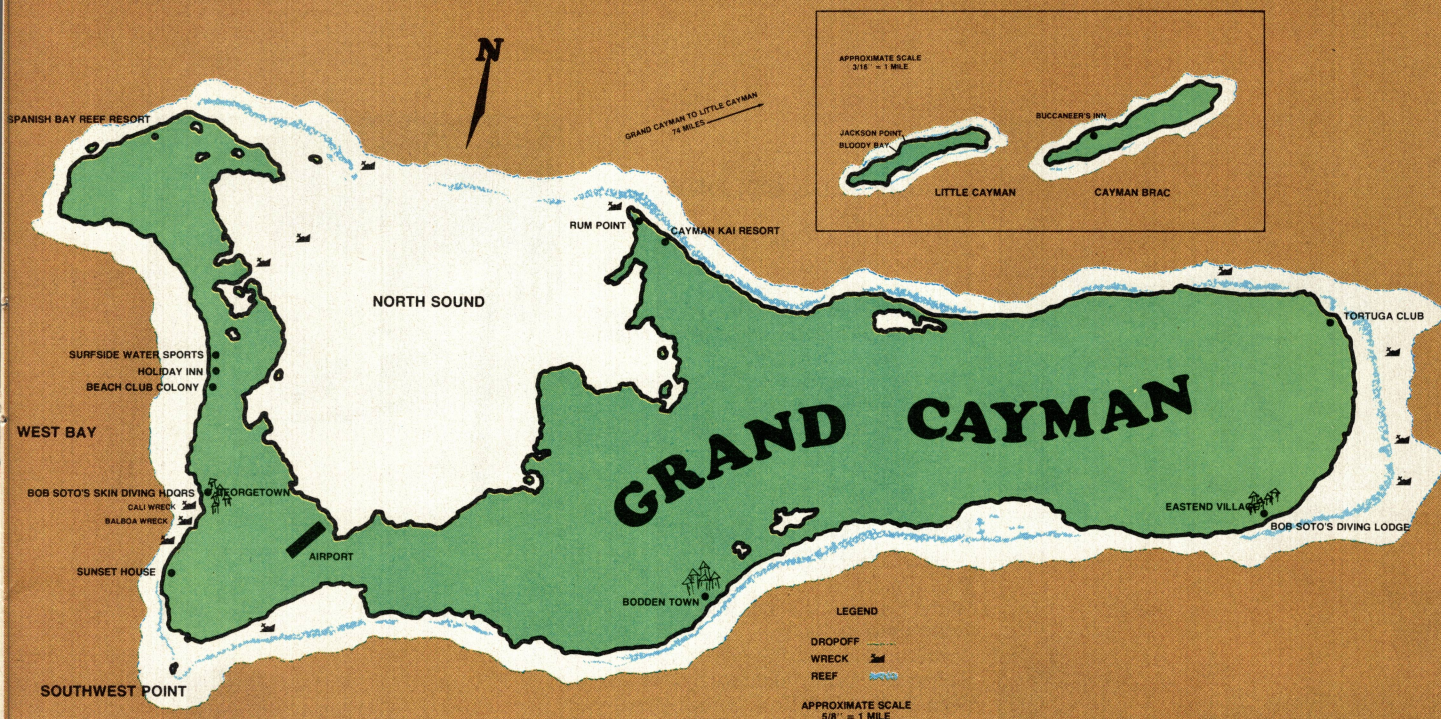
By Jack McKenney

**F**or the past ten or more years, the Cayman Islands have been noted for providing not only excellent diving with tremendous variety, but they have rapidly escalated to probably the top position in the Caribbean for diving facilities and services offered. Caymanians are some of the friendliest islanders in all of the West Indies. With open arms they welcome American tourists and long ago recognized the valuable commodity they have in visiting divers. It's estimated that almost 25 percent of the visitors to the islands are sport divers. There are over 20 professional dive guides on Grand Cayman, 22 boats used primarily for diving, over 600 scuba tanks, and at least 17 compressors capable of pumping a combined total of 190 cubic feet of air per minute. There is also a double-lock two-man recompression chamber (it can handle four in an emergency) on call any hour of the day or night. But in spite of all the fevered diving activity taking place on Grand Cayman, there are so many excellent places to dive that a first time visitor might well feel he's the only one ever to have dived the island.

The Cayman Islands are a projection of the Sierra Maestra mountain range in Cuba lying 150 miles to the east with the underwater ridge continuing westerly to Belize in Central America another 480 miles away. Situated in the upper middle portion of the Caribbean, the islands present a combined total of close to 100 miles of steep vertical wall diving beginning as shallow as 20 feet off Little Cayman, and plunging down for 600 feet or more before sloping off to points north, south, east, and west. In addition, there are acres upon acres of hard coral elkhorn forests, caves, coral heads, and wrecks. Water temperature is in the high 70's during the summer months (low 80's in the shallows), and visibility varies from 125 feet to over 200 feet. In a nutshell, the Cayman Islands have any type of diving that novice snorkelers to advanced expert scuba divers could ever possibly hope for.

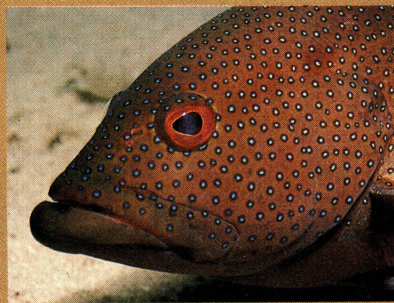
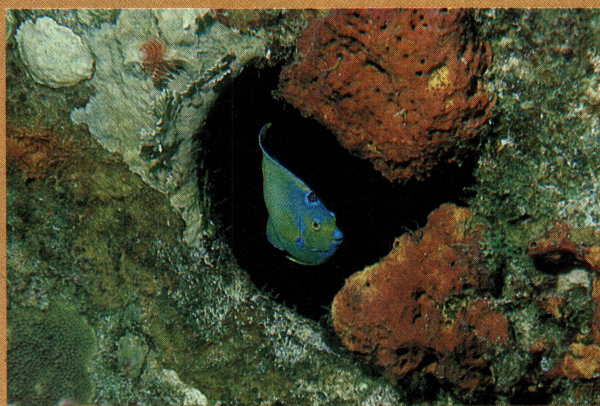
Grand Cayman is the largest of the three islands stretching some 22 miles from west to east. It is a lopsided horseshoe shape with a peninsula on West Bay closing in the North Sound. Because the North Sound is, in effect, a marine estuary, fish life is prolific and abundant around the island. Just about anyplace that a boat hook is dropped along the 20 miles or so of North Wall, where Cayman Kai is situated at Rum Point, a diver will find great wall diving. Craggy fissures and cuts predominate in certain areas, and circular chimneys that drop vertically down





# To The Cayman Islands

photography by Author







Beach Club Colony on Seven Mile Beach. 38 rooms/accommodates 152.



Holiday Inn Dive Shop. Hotel has 183 rooms/ accommodates 400.



Bob Soto Lodge. 17 rooms and 1 apartment/accommodates 40 divers.



Buccaneer's Inn. The Inn has 14 rooms/accommodates 28.

### BEACH CLUB COLONY

P.O. Box 903

Grand Cayman Island, B.W.I.

Telephone: 9-2023

Manager: John Hanna

Stateside Rep: Robert Reed Associates, Inc., Chicago, New York, Miami, Toronto, London.

Dive Services: (See Bob Soto's Skin Diving Hdq's. below)

Special Features: Tennis Courts

### BOB SOTO'S SKIN DIVING HDQ'S LTD.

P.O. Box 894

Grand Cayman Islands, B.W.I.

Telephone: 9-2483

Owners: Bob Soto/ George Krohn

Services: Holiday Inn/Beach Club Col.

Dive Guides: Bob Soto, NASDS, George Krohn, NASDS, PADI, Peter Melbourne, SSI, Don Foster, Art Fleming, PADI, YMCA, Kem Jackson, NASDS.

Tanks: 250

Compressors: 21.5 cfm (Swedish) comp., 15.5 cfm Augus Arandits

Dive Trips: 9:00 a.m. and 1:30 p.m.

Cost: Two tank a.m., \$16.00, one tank p.m., \$13.00, night dive available.

Dive Boats: 45' landing barge/50 divers, 36' landing barge/25 divers, 40' glass bottom boat/20 divers, 19' boat/6 divers, 16' boat/4 divers

### BOB SOTO'S DIVING LODGE

P.O. Box 894

Grand Cayman, B.W.I.

Telephone: 9-2483

Manager/Dive Guide: Dave Woodward, NAUI.

Compressor: 14 cfm Mako

Tanks: 20 (more available if required)

Dive Trips: 9:00 a.m. (two tanks), 1:30 p.m. (one tank)

Cost: Morning dive, \$16.00, afternoon dive, \$13.00

Dive Boat: "Deep Six" 28' x 10' steel hull/18 divers

### BUCCANEER'S INN

P.O. Box 68

Cayman Brac, Cayman Islands, B.W.I.

Telephone: 8-7257

Manager: Glorine Scott

Dive Guide: Peter Sanford

Compressor: Mako

Tanks: 42

Dive Trips: Schedule is open, but generally two per day.

Cost: Cost of boat divided between divers, plus rental of tank (tank w/air \$4.00 per day; air fill is \$1.50).

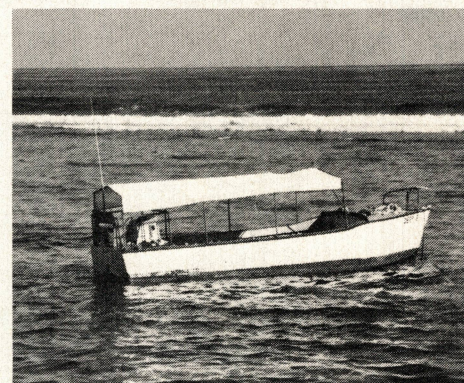
Dive Boats: 36' Bertram (\$190.00 per day)/6 divers, 36' Striker (\$125.00 per day)/8 divers, 20' aluminum barge (\$50.00 per day)/10 divers



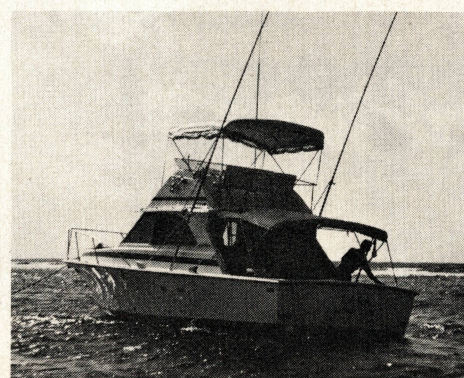
Soto barge ready to load divers at the Beach Club Colony.



The Soto's at Georgetown Headquarters.



Deep Six prior to loading for East End trip.



36-foot Bertram prior to Little Cayman trip.



for 30 to 50 feet then open out into the cobalt blue ocean are commonplace. Black coral trees of huge proportion can be found at just about any drop-off area of the three islands and it's frowned upon to pick this, or any other type of living creature. There is a strong conservation movement in the Caymans, organized by some of the dive operators and hotels. They are not radicals but feel simply that Cayman's priceless heritage should be left intact for all visitors to enjoy. If every diver who visits the island were to leave with a black coral tree, the surrounding reefs would be devoid of black coral inside a few months.

At the east end and along the south shore to the southwest point can be found good drop-offs too to a lesser degree, but the highlight of diving this area either out of the Tortuga Club or Bob Soto's Lodge are the superb shallow elkhorn coral reefs that crown labyrinths of limestone caves and grottoes housing grouper, giant blue parrotfish, and at the southwest point, some pretty impressive looking tarpon.

Along West Bay where Georgetown's population of 3500 reside, is a harbor that has to be the most heavily dived harbor in the Caribbean. There are two very popular wrecks located here, the *Cali* and the *Balboa*. Probably more movie footage and pictures have been shot on the *Balboa* than any other wreck in the world. The *Balboa* was a grain carrier that sank during a hurricane in 1932 in just 35 feet of water. All of the dive guides from Spanish Bay Reef at northwest point to Bob Soto's guides working out of Bob Soto's Diving Headquarters, Holiday Inn, and Beach Club Colony, the Surfside Watersports divers at Galleon Beach and Royal Palms hotels, and the Sunset House divers have been feeding the fish on the wreck. Needless to say, they are well fed, friendly, and at times make it difficult to concentrate on taking pictures of a grouper for example, because there are 50 or 100 other sergeant majors, Spanish hogfish, and angelfish buzzing around the photographer. It's an interesting wreck to dive and the underwater photographer can exercise all of his photographic capabilities from macro shooting to extreme wide angle photos. It's also a superb wreck for night diving and most of the resorts feature night diving excursions to it.

North of Georgetown is a pine studded beach called Seven Mile Beach — seven miles of sugar fine sand lying in the lee of West Bay. Although I suppose it does happen, in five visits to Grand Cayman I have never seen it rough on this side of the island. There are equally good drop-offs here as well as good shallow reefs, too. And no matter where one stays anywhere on Grand Cayman there is excellent diving close by — five to 15 minutes away by boat.

Each resort features their own secret spots but many of them do overlap. There are probably 50 popular different diving sites around the island, but simply moving the boat another 100 yards down the reef opens up more new areas to explore.

Seventy-four miles southeast of Georgetown and about 45 minutes by air aboard a Cayman Airways DC3 is Cayman Brac, the highest of the Cayman Islands — boasting an altitude of 150 feet — and the second largest — ten miles long and roughly one and a half miles wide. Five minutes from the airport on the main road that courses through the Brac is the Buccaneer's Inn built







Cayman Kai Resort Ltd. 26 sea lodges/accommodates 200-235.

### CAYMAN KAI RESORT LTD.

P.O. Box 1112

Grand Cayman Island, B.W.I.

Telephone: 9-2273

Booking Agent: Hotel Plans Inc., 1301 W. 22nd St., Oakbrook, Ill. 60521

Resident Manager: Dick Polk

Dive Guide: Gale Anspach, PADI.

Compressor: Two 15 cfm Worthingtons  
Tanks: 86

Dive Trips: 9:30 a.m. & 1:30 p.m.

Cost: \$13.50 w/tank

Dive Boats: 28' x 14' flat top barge/18 divers, 22' Aquasport/6 divers, 14' Boston Whaler/4 divers, 15' Woodson/4 divers



Flat top barge loading for North Sound.



Spanish Bay Reef Resort. 10 units/accommodates 24.

### SPANISH BAY REEF RESORT

P.O. Box 800

Grand Cayman Island, B.W.I.

Telephone: 9-3493

Resident Owners: Ron & Nancy Sefton

Manager: Lachlan MacTavish

Dive Guide: Edward Ebanks

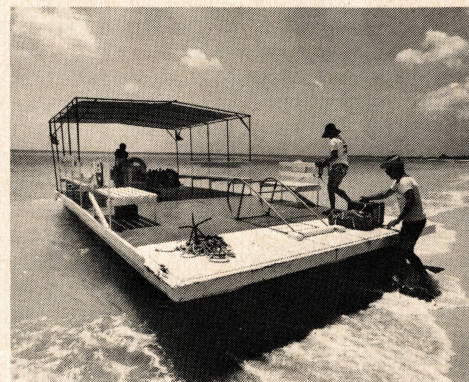
Compressor: 15 cfm water cooled  
Worthington

Tanks: 50

Dive trips: 9:30 a.m. & 1:30 p.m.

Cost: \$12.00 w/tank

Dive Boat: 34' x 14' Tri hull dive platform



Ron Sefton boarding platform for West Bay.



Sunset House. 18 doubles, 2 efficiencies, 3 1-bedroom apartments/accommodates 46.

### SUNSET HOUSE

P.O. Box 479

Grand Cayman Island, B.W.I.

Telephone: 9-2511

Manager: Mrs. Hebe Conners

Dive Guide: Adrian Briggs

Compressor: 15 cfm Worthington, 8 cfm  
Mako

Tanks: 90

Dive trips: Two tank trip leaves 9:30 a.m.

Cost: \$15.00 — two tanks

Dive Boats: 35' Fiberglas LCVP/20-30 divers, 30' Dons Marine/12 divers



LCVP off-loading a Midwest dive club.

### SURFSIDE WATERSPORTS

P.O. Box 26

Grand Cayman Island, B.W.I.

Telephone: 9-2724

Owner/Manager: Jim Dailey

Dive Guides: Lt. Michael Camborne, RN diving officer, Mark Roman, PADI, SSI, Osmond Ebanks, Clinton Ebanks, Byron Powell, PADI, Jim Dailey, NASDS, PADI.

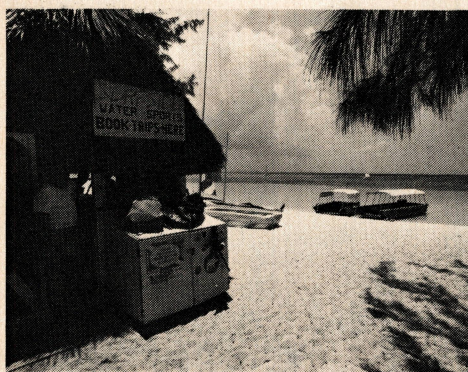
Compressors: Three 8 cfm Makos

Tanks: 156

Dive Trips: 9:00 a.m. & 1:30 p.m.

Cost: \$16.25 two tanks (a.m.), \$13.00 one tank (p.m.), \$20.00 one tank (night dive).

Dive Boats: 8 meter barge/20 divers, 12 meter barge/30 divers, 31' Bertram/12 divers, 21' outboard/7 divers, 16' outboard/4 divers



Surfside Watersports located between Holiday Inn and Galleon Beach Hotel.



Surfside boats pull up to Seven Mile Beach.





*Tortuga Club. Rooms open right onto beach. 14 rooms/accommodates 35.*

## **TORTUGA CLUB**

P.O. Box 496

Grand Cayman Island, B.W.I.

**Telephone:** 9-2284

**Manager/Owner:** Suzy Bergstrom

**Dive Guides:** Wayne Brown, PADI,  
Darby Bodden, NASDS cert.

**Compressor:** 8 cfm Mako

**Tanks:** 18

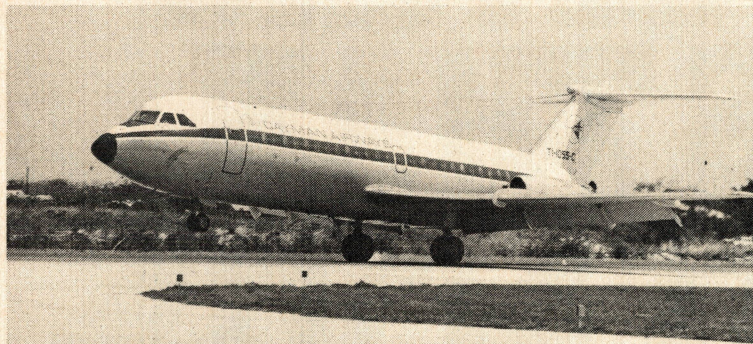
**Dive Trips:** 9:30 a.m., second trip on demand

**Cost:** \$40.00 boat rental divided by number of divers plus tank rental (\$3.00)

**Dive Boats:** 16'8" Boston Whaler/8 divers, 22'2" Aquasport/15 divers.



*Snorkelers entering the water on Hotel Beach.*



*Above is a Cayman Airways jet after it has landed at Grand Cayman Island Airport. Direct inquiries about their daily flight schedule to: Cayman Airways, 238 Biscayne Boulevard, Miami, Florida 33132.*



*A diver obtains a jeep from Cico Rent-A-Car Systems, P.O. Box 400, Grand Cayman Island, B.W.I. Phone: 9-2468, day; 9-4242, night.*

back from an ironshore and nestled among thick palm trees and tropical foliage. There is fine diving out in front of the hotel in 30 to 40 feet of water and the drop-offs are also very good, but they start a little deep — around 100 feet.

One of the most attractive features about the Brac, besides the interesting dry land caves to explore and its very friendly people, is its close proximity to Little Cayman just 15 miles away. Little Cayman, which is the smallest of the three islands, is nine miles long and one and a half miles wide and for the most part is undeveloped. There is a sportfishing club on the island consisting of seven efficiencies that, while I was there, was being negotiated for by Buccaneer's Inn to take over and use as an extension of their facilities on the Brac. For the diver who would really like to get away from everything, including even a car driving by, Little Cayman would be an attractive place to stay.

The main attraction, however, is along the north shore of the island for it boasts a fine, shallow drop-off. For two miles along Bloody Bay and Jackson's Point, this reef edge that plunges sharply down a sheer escarpment begins in just 20 feet of water. An exciting wall dive can be made in just 60 to 100 feet of water and much of the very prolific lacy pink and azure sponges hanging on huge black coral trees are found no deeper than this. And as a bonus, all along the upper edge of this wall sloping back into the shallows is a thriving soft coral and sponge reef loaded with tiny tropicals and friendly curious fish. The Little Cayman drop-off is a very special thing to see!

I stayed at seven different hotels on this trip and can highly recommend them all. And although accommodations range from a low of \$33.00 per day, double occupancy, AP (April 15 to Dec. 15), to a high of \$100.00 per day, double occupancy, AP (Dec. 15 to April 15), it's best to write directly to each hotel because they all have money saving diver packages to offer. Addresses are listed opposite the pictures. Be sure to send any inquiries 21¢ air mail so your letter doesn't arrive by slow boat from Miami a month later. You might also want to write the Cayman Islands Tourist Board in Florida at 250 Catalonia Ave., Suite 604, Coral

Gables, Florida 33134.

There are all sorts of diver activities available on the island from underwater photo classes, marine biology courses, and perhaps in the future even a treasure hunting workshop, all taking place in summer months. While I was at Spanish Bay Reef, Jerry Greenberg was conducting an underwater photo class there, and incidentally, if you want to obtain an excellent and beautiful map of Grand Cayman, photographed and printed by Jerry, many pro dive shops are handling them for \$2.50. If your favorite one isn't carrying them, have them write directly to Jerry about obtaining this and other maps and posters. The address is: Seahawk Press, 6840 SW 92 St., Miami, Florida 33156. The map will make a handsome addition to any divers den.

You can reach Grand Cayman from Miami aboard Cayman Airways jet liners, which depart at 1:15 p.m. every afternoon in addition to a flight most mornings. The comfortable jet service takes only one and one-quarter hours to fly to Cayman. And be sure to take your camera aboard for some interesting aerals as you fly over Cuba. Write Cayman Airways at their Miami address for a flight schedule. Southern Airlines have recently opened an office in Grand Cayman too, and can be contacted at: P.O. Box 1059, Grand Cayman Islands, B.W.I.

Before visiting the island, it might be a good idea to write to Cico Rent-A-Car and reserve yourself some transportation. There are some interesting sites to visit all around the island from the Turtle Farm at Northwest Point to Pedro's Castle on the South Shore and East End Village, too. And be sure to make the Grand Old House for dinner one night. It's fabulous! Cico has a total of 20 new Jeeps, 80 Fiats, and if you want to ride in style, although they're not really ideal for divers and all their gear, two American Motors Pacers.

Grand Cayman diving is beautiful and easy, there's lots of it and it's close to the United States. After easily clearing customs, you'll be able to check into your hotel and that same day be exploring some coral grottoes, diving along the edge of a drop-off or exploring a very beautiful shipwreck! >>>



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very best spots are featured in all of our package plans.

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## KEYS PERSONALITY OPENS NEW SHOP



Bill Crawford, well known Florida Keys personality, recently opened a new dive shop facility at the Tiki Isle Marina, Key Largo. Formerly based at Key Largo Diving Headquarters, Crawford is best known for his expertise in underwater photography and specialized photo training classes.

Crawford is presently completing construction of a full service dive shop facility, conveniently situated at dockside in the marina. Shop features include a 5000 psi air compressor, underwater photo salon display, and a scuba training classroom complete with the most modern audio-visual aids equipment. His custom design 29-foot dive boat, *Photo Diver Too*, is berthed directly in front of the dive shop door, providing convenient loading of scuba gear and passengers.

The Tiki Isle Marina is located on the ocean side of U.S. Highway 1, halfway between markers 104 and 103. A sign on

the highway indicates the side road leading to the newly developed marina complex. Crawford offers dive trips to various popular locations within Pennekamp Park on a daily basis, and twice daily during peak vacation periods. For more information and brochures, write to: Bill Crawford's Tiki Isle Dive Shop, Inc., P.O. Box 755, Key Largo, Fla. 33037. ✉

## NEW BOAT FOR AMERICAN DIVING

Harry Keitz, president of American Diving Headquarters, announces the addition of a second dive boat to his growing fleet of scuba facilities. Christened *American Diving II*, his newest craft is a 38-foot custom built tournament tuna boat, featuring an exceptionally wide beam of 14½ feet. Powered by twin 471 diesels, she cruises comfortably at 16 knots.

The craft is Coast Guard licensed to carry 20 divers for day trips to the various reefs in Pennekamp Park. Her flying bridge stands a good 12 feet above the water, providing an excellent vantage point for spotting coral heads and hard-to-find diving locations. *American Diving II* is fully equipped with the latest electronics, including a Raytheon recording fathometer, VHF radio, and CB radio. A custom design diving platform measuring a full 14 feet wide has been installed at the transom, complete with twin ladders leading to the deck. Other

features include a full galley, refrigerator, head, and shower.



Berthed at American Diving's new marina facility, the *American Diving II* is centrally located to all points of Pennekamp Park. She operates on a daily basis, visiting a variety of famous dive spots such as: The Elbow, Carysfort Reef, Christ of the Abyss, and many more. The boat can also be privately chartered for overnight or longer trips to Cay Sal Bank, Bimini, or other virgin reefs in the Bahamas. She can sleep up to six divers for extended voyages.

*American Diving I*, the store's first boat, is now being utilized mainly for open water training classes and check outs. Many northern based instructors bring their students to the Florida Keys for their graduation dives as a fitting introduction to the ocean environment.

For more information and brochures, write to: Harry Keitz, American Diving Headquarters, Inc., Route 1, Box 274-B, Key Largo, Florida 33037. ✉



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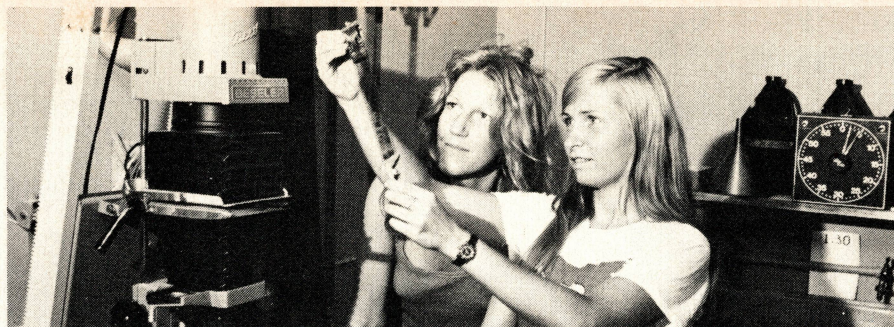
## AQUAVENTURE PHOTO DEN

Aquaventure, a young and dynamic dive complex on the island of Bonaire, Southern Caribbean, has just added another attraction to its already super aquatic complex. Capt'n Don has been quoted to say Aquaventure is like a large box of rich soil in which there is planted fertile seeds. The photo den is planted and growing well.

Teacher Bruce Bowker, senior dive educator, has just recently inaugurated the photo den which he heads. Cameras, by no means, have been strangers to Bonaire. However, the Paul Tzimoulis Photo Course early this year has catalized the greatest activity and enthusiasm over cameras that the area has ever known.

To date, there is a fair size commercial photographic processing lab which is located right in the dive complex. It has been dedicated to James Marshall, an Aquaventure diving friend who gave his entire diving vacation to the engineering and training of the lab's staff.

Adjacent is the photo den which is the true heart of all things photographic. It sponsors not only double quick processing, but weekly photo contests and a real nifty photo of the day display which is the darkroom girl's idea of the best daily shot. The Magic Lantern is a show and tell night, which encourages guests



to bring slides and film of past vacations. The Aquaventure photo den also provides first aid to flooded things and racks of rentals, stills, movies, cases and green things and even sheet lead for making ballast for visiting divers' housings.

In addition to the new photo lab facilities, Aquaventure has recently embarked on a new teaching concept called photo coaching. Teacher Bowker personally conducts several trips weekly for the purpose of giving helpful hints to aspiring underwater photographers. This will probably be one of the most effective and most popular forms of instruction in coming years. Cost is minimal and enrollment is as simple as signing up for an afternoon dive trip.

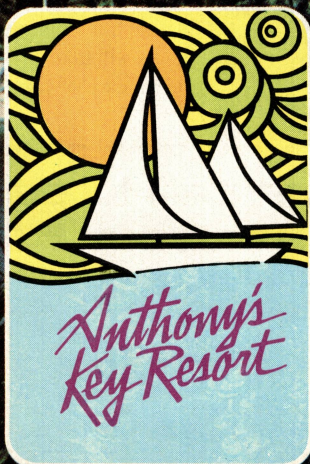
The 1975 SKIN DIVER Reader's Survey shows 74.2% of all divers are involved in photography, therefore indicating the tremendous need for training programs, rapid service, equipment and sales.

Captain Don has estimated that over 30 rolls of film representing 1100 exposures are shot daily in the reefs of Bonaire, and says that this thing should have been installed a year ago. However, he is now impatiently looking forward to that next fertile seed which he hopes will be a marine biology station at Nukove.

Rates are nominal, considering location and traffic. Black and white processing \$4.00 for film and proof sheet. Enlargements from 3 x 5" to 20 x 24". The popular 8 x 10" is \$2.50. Colored transparencies E-4 processing \$4.00 unmounted. Mounting material is available for both prints and slides. Kodak Super 8, Ektachrome 64 and 160, B/W Tri-X 400, and Fuji 100, GE bulbs, are all found normally in stock.

For more information about the photo den and Aquaventure, contact: Lisind International, 5 World Trade Center, New York, N.Y. 10048.

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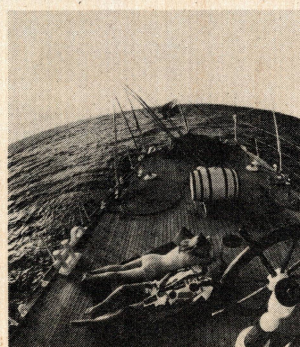
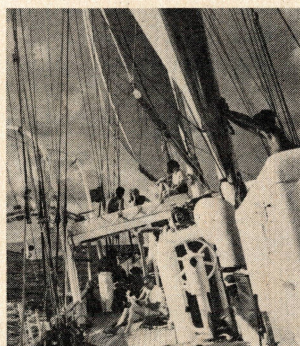
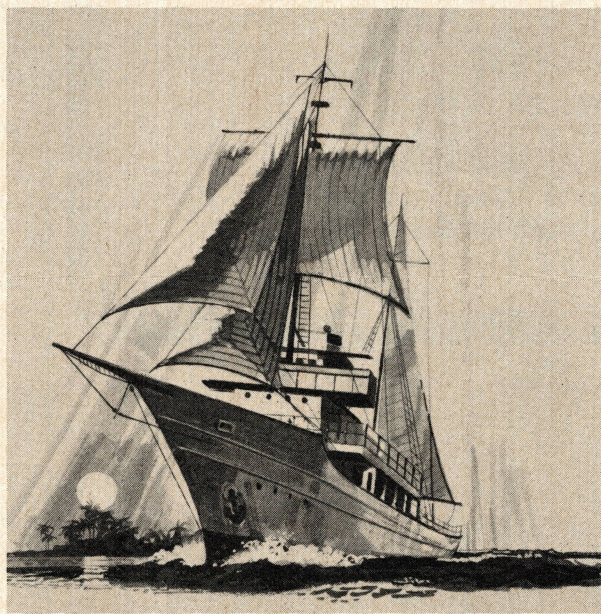
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## SCUBARAMA AT ISLAMORADA

The wet set gets it together this fall at Holiday Isle Resort with the first Scubarama. Holiday Isle Resort in Islamorada, Florida has planned this four-day event for divers, starting September 30, 1975 through October 3, 1975. This is so divers can enjoy the most



beautiful weather of the year and take advantage of the low off-season rates. The program has been arranged so that divers may participate in as many or as few of the events as they would like and still have ample time left to relax and enjoy their stay in the fabulous Florida Keys. Some of the highlights will be:

*The Underwater Treasure Hunt* — Every morning for three mornings divers will have an opportunity to not only dive on the beautiful reefs and see some of the world's loveliest coral and tropical fish, but perhaps come back with authentic Spanish treasure from an 18th century galleon. On display in the dive shop will be real pieces of eight with an estimated value of \$100 each, while their numbered replicas have been placed back out on the reef to claim. There is no entry fee for this event, just the normal cost of a boat dive. And it is open to all registered Scubarama participants.

*An Outdoor Underwater Film Festival* — You sit under starlit skies, sipping your favorite beverage available at the Tiki Hut, while Paul Tzimoulis takes you on a guided underwater tour. Just a few of the ten films Paul will be showing are: Stan Waterman's *Call of the Running Tide*, Al Giddings' *Silent Warrior*, Lee Tepley's *Cloud Over The Coral Reef*, *Truk Wreck Dive* with Cameron Mitchell, and a Scripps Institute film *Underwater Wonders*. In addition to the films, Paul will show some of his favorite slides and Rick Frehsee will also show films and slides. And it's all free. There will be three evenings of approximately one hour and thirty minutes of films, and a different program each night.

*Underwater Photo Workshop* — Rick Frehsee, our instructor, is teaching two complete courses which include lecture sessions and boat dives. Each course is a day and a half and will cover such subjects as: introduction to light, lens, and camera theory, definition of underwater photographic system, available light



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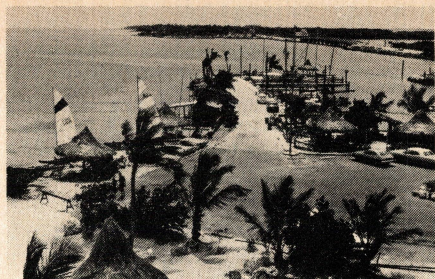
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technique and light meters, artificial light technique including strobes and flash bulbs, underwater macro photography — subject selection and composition. There will also be slide presentations shown on a multi-projector system and a static display of Nikons cameras featuring popular pieces of camera equipment. Rick will be on the two boat dives to help with individual equipment problems. We have also arranged for overnight processing of your first day's film so that it is ready for a critique and analysis session on the second day.

*The Tropical Fish Workshop* will teach you how to catch fish like the big guys. This course is being taught by Skip Nielsen, whose 15 years of experience has made him an expert and whose family owns one of the largest aquariums in the Keys and Cozumel, Mexico. Skip is teaching two full courses which will run one and one-half days each. At the end of this time, a diver can learn the identification of tropical fish taught during a field trip to the nearby aquarium, the method of collecting, how to build professional collecting equipment, holding — which includes decompression and transportation to the tank, as well as the setting up of an aquarium. The instructor will be there in the water demonstrating the catching techniques both with snorkel and scuba gear.

Woven throughout these interesting activities will be sunset watch cocktail hours. Each evening also brings a cook out on the beach. A fish fry on Tuesday night; barbecued beef ribs on Wednesday night; and for the finale on Friday evening — a luau and live music.

*Swap meet and dive equipment auction* — The head auctioneer, Ed Armstrong, is doing his thing on Friday morning in front of the dive shop. All Scubarama guests are invited to bring their old gear and either swap with others or sell it outright.

There are many more diving and non-diving activities planned, so bring your families.

Your Scubarama committee: Holiday Isle Resort & Motel — Greg Gobel; Holiday Isle Dive Shop — Ed Armstrong; Long Range Dive Boat *Hi! There* — Pat Anderson. For more information and a complete schedule of events, write to: Holiday Isle Resort, P.O. Box 588, Islamorada, Florida 33036; or call Pat Anderson at (305) 664-4283, or the Holiday Isle Dive Shop at (305) 664-4145 and ask for Ed Armstrong or Pat Anderson.

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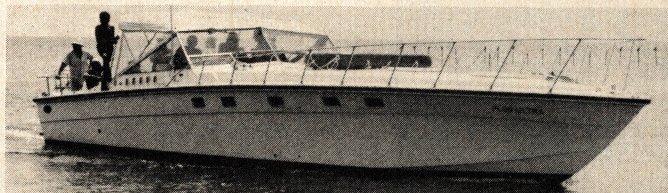
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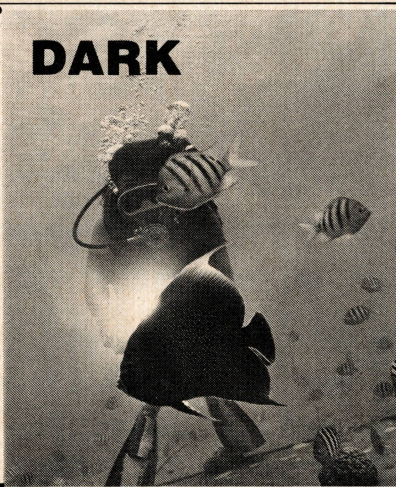
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PHOTOGRAPHY

## BONAIRE SCUBA FEST

The island of Bonaire's Tourist Board early this year declared 1975 to be the year dedicated to the tourist, both in attendance and activities, thus setting the Board about gathering and inventing activities designed for off-island visitors.

By mid April, 19 major events had been scheduled and publicized including the 6th annual International Sailing Regatta which Capt'n Don from Aquaventure was instrumental in promoting. This year it will be from Oct. 22nd through Oct. 25th.



Capt'n Don's newest project, the 20th event on the calendar, is Bonaire Scuba Fest One (BSF-I) which is now officially scheduled to begin August 22nd and close September 19th. BSF-I is 28 solid days of scuba fun divided into four 7 day periods that will be crammed to the brim with scuba-happenings from breakfast to nightcap.

On the opening day, Aquaventure will be at the Flamingo Airport to hand over the Symbol of SOD to the new arriving host who will be one of the four renown diving celebrities invited to host each of the one week periods.

The symbol of SOD is a virgin twig of black coral, representative of the island of Bonaire and its ecology minded people. Black coral which flourishes in water as shallow as 45 feet is well protected by law as is all the coral and inhabitants of this underwater wilderness island. Each week this symbol will be presented to the new host.

SOD, which some consider a mythical character is really the Sage of the Deep. Many friends of the Aquaventure Complex thought that fellow Neptune and his old beard, encrusted crown of gold and the trident (which to Bonairians is a symbol of destruction) just did not fit the modern diver. SOD came into being as the birth of a watery being that roams all the warm reefs of the world protecting the creatures and compressed air breathers alike (sort of a Doc Savage, Tarzan, and Flash Gordon compressed into one).

Aquaventure is currently logging an average of 675 dives per week covering some 48 available reef trips. BSF-I is nothing more than putting four normal



weeks back to back with a special host for each week along with an extra barbecue, several more parties, tossing in three more lectures and seminars, a treasure hunt, photo contest, picnic, movies, slides and show and tells, and something all of us have wanted for years, a Gimmick Fair. This fair will display products from all the major manufacturers. These products cannot only be seen, felt and handled but actually checked out by the diver to take along on his next reef trip.

The entire island is involved in BSF-I. Hotel Bonaire and its bungalows are starting to fill with reservations along with the Flamingo Beach Club. All the hotels are setting aside many rooms available only to divers and their families. EWOWO, the Caribbean's wildest discotheque will be open for special parties. Hertz is adding extra cars to the rental line to accommodate the expected guests and divers.

It is no doubt BSF-I will be an exciting and fun filled month. "Programming and designing fun things for the kind of folks that love sailing and diving is a pleasure", says Capt'n Don. The Captain has catered to divers and their fun packed vacations dating back to the early fifties when he was windjamming the topmast schooner *Valerie Queen* between Long Beach and Catalina.

Following the BSF-I the Caribbean Ecology Conference is on Bonaire's calendar for September 25th through

28th. Billy Kielman, agent for Aquaventure and the Hotel Bonaire, further reports a splendid chance that the NAUI Post IQ-7 will visit Bonaire September 29th through October 6th. Forty-five maddening days of pure scuba programs. This surely should prove to Bonaire that she has been discovered.

For information and package prices contact any of the following: Lisind International, 5 World Trade Center, New York City; or the Bonaire Tourist Information Offices, 685 Fifth Avenue, New York City. Ask your dive shop to look into it for you or just write: Capt'n Don, Bonaire, N.A. ✉

## KEY LARGO DIVING HDQRS SERVICES

Key Largo Diving Headquarters has increased its U/W photography division adding a more extensive line of cameras, housings and accessories which will allow them to expertly outfit a diver with the best possible system for their individual requirements.

The manager, Dave Lindsay, who hails from Toronto, announces that a newly revised one and two day underwater photography course and clinic are available covering a variety of subjects from basic camera, lenses, film and composition, to U/W flash and close-ups. Alterations are now underway in their complete darkroom to permit more efficient processing of film used in their classes.

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dive shop, diving instruction is available at the Diving Headquarters for NAUI, PADI and ACUC certification. For those requiring diving equipment, a complete sales and rental inventory is available. They also have dormitories and efficiency units to provide comfortable lodging at a reasonable price close to the docks for loading gear. These facilities provide divers the convenience of booking complete dive vacations with just one reservation.

Reef trips to John Pennekamp Coral Reef State Park are being run daily on the custom designed 48-foot *Photo Diver*, as well as the 48-foot *Coral Sea*, 36-foot *Reef Chopper*, and the 24-foot *John Boat*. All dive trips are conducted by Coast Guard licensed captains and highly qualified safety personnel, providing a safer, more enjoyable trip. To finish a perfect day of diving, try one of their cook out parties where you can sip a rum punch as you watch the sunset on the water.

For further information about these and other services, contact: Key Largo Headquarters, Route 1, Box 293, Key Largo, Florida 33037. ✉

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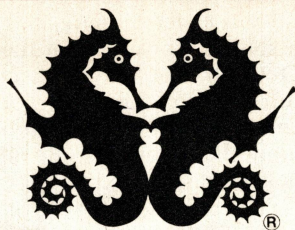
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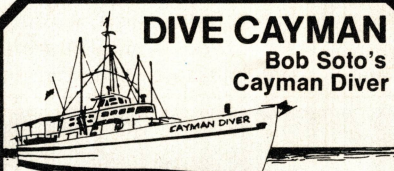
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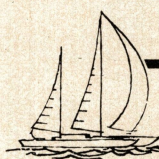
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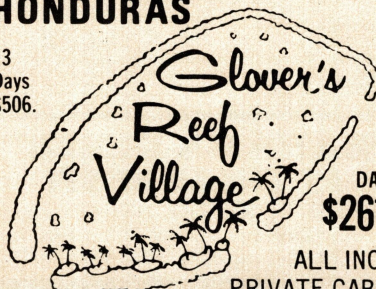
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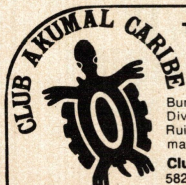
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The heart of the Pennekamp diving operation is a 60-foot Harker's Island dive boat known as the *Infante*. She is Coast Guard licensed to carry 48 passengers, but dive trips are limited to 35 divers for maximum comfort and safety. The *Infante* departs daily at 9:30 a.m. for a scheduled one tank scuba dive and subsequent snorkeling dive at one of Pennekamp Park's many beautiful coral reefs. The cost of the trip is \$10, plus the cost of any scuba gear which must be rented separately.

In addition to the *Infante*, the Park schedules two independently operated six-passenger dive boats which run twice daily and offer two-tank scuba trips. The *Divemaster* is a 24-foot Stapleton utility craft with a Bimini top, skippered by Capt. Frank O'Connor. The *Miss Budwiser* is also a 24-foot Stapleton of the same design, and is skippered by Capt. Doug Droge. The price of the two-tank dive trip is \$12.50 plus gear rental.

Rental services at the Park include 72 cu. ft. galvanized steel tanks, single hose regulators with submersible pressure gauges, Nikonos II underwater cameras, Subsea Mark 25 strobes, 18 foot boats with 50 hp outboard motors, and 20 foot boats with 85 hp outboards.

For more information, prices, and brochures, write to: Randy Pegram, Coral Reef Company, John Pennekamp Coral Reef State Park, P.O. Box 13-M, Key Largo, Florida 33037.

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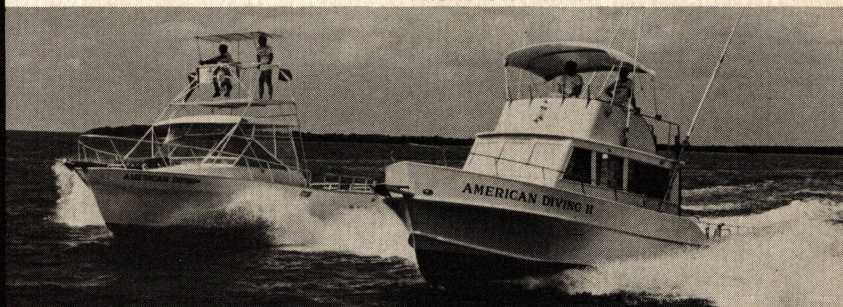
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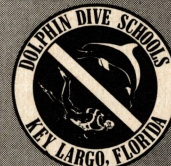


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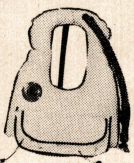
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## Dive Tour News



- Aug. 1—VIRGIN GORDA, V.I.—12 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Aug. 1, 8, 15, 22, 29—BONAIRE—8 days, Lisind Int'l, New York, N.Y.
- Aug. 2—NORTH ELEUTHERA—7 days, Scuba Tours, Fairfax, Va.
- Aug. 2, 23—CAYMAN ISLANDS—8 days, See & Sea Travel, San Francisco, Calif.
- Aug. 3, 17, 31—COZUMEL—8 days, Go Mexico, Inc., Minneapolis, Minn.
- Aug. 4 & 25—COZUMEL—8 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Aug. 5—CARTAGENA, COLOMBIA—10 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Aug. 5—KONA COAST, HAWAII—10 days, Sierra Club Outings, San Francisco, Calif.
- Aug. 5, 19—TORTOLA, BVI—13 days, Trimarine Misty Law, St. Thomas, Virgin Islands
- Aug. 6—LORETO, BAJA CALIFORNIA—4 days, Club Baja California Inc., Long Beach, Calif.
- Aug. 7—GUAM, PALAU, SAIPAN—11 days, Innerspace Adventures, Pearl City, Hawaii.
- Aug. 7, 14, 21, 28—KONA, HAWAII—aboard Fair Wind, See & Sea Travel, San Francisco, Calif.
- Aug. 8—NASSAU—14 days, Skeet LaChance, Adventure Cruises, Ft. Lauderdale, Fla.
- Aug. 9, 23—BAHAMAS—7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, Fla.
- Aug. 9—COZUMEL—8 days, See & Sea Travel, San Francisco, Calif.
- Aug. 11—CAY SAL—2 days, Capt. Tom Guarino, Islamorada, Fla.
- Aug. 12—BARRIER REEF, MEXICO—11 days, Windjammer Cruises, Inc., Miami Beach, Fla.
- Aug. 15—ROATAN—14 days, Arthur Sams, Explorer Council, Los Angeles, Calif.
- Aug. 16—BONAIRE—9 days, John Kelly, See & Sea Travel, San Francisco, Calif.
- Aug. 16, 30—SAN ANDRES—8 days, Go Mexico, Inc., Minneapolis, Minn.
- Aug. 16—ROATAN—8 days, Go Mexico, Inc., Minneapolis, Minn.
- Aug. 17—BAJA CALIFORNIA—6 days, Sierra Club Outings, San Francisco, Calif.
- Aug. 17, 24, 31—BELIZE—7 days, Go Mexico, Inc., Minneapolis, Minn.
- Aug. 17—KONA, LANAI, MAUI, OAHU—10 days, Innerspace Adventures, Pearl City, Hawaii.
- Aug. 17—HAWAII, TRUK, PONAPE—20 days, Innerspace Adventures, Pearl City, Hawaii.
- Aug. 18—ELEUTHERA—7 days, Happy Wanderer, Bronxville, N.Y.
- Aug. 20—BAY ISLANDS, CENTRAL AMERICA—12 days, Windjammer Cruises, Inc., Miami Beach, Fla.
- Aug. 21—HAWAII—10 days, Arnold Stollar & Roy Damron, UNEXSO, Pompano Beach, Fla.
- Aug. 22—CHINCHORRO REEF—13 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Aug. 22—HAWAII/ALL ISLANDS—10 days, U/W Explorers Society, Freeport, Grand Bahama
- Aug. 22—COZUMEL—8 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Aug. 25—NASSAU—7 days, Skeet LaChance, Adventure Cruises, Ft. Lauderdale, Fla.
- Aug. 25—CAY SAL—2 days, Capt. Tom Guarino, Islamorada, Fla.
- Aug. 26—PONAPE, TRUK—11 days, Innerspace Adventures, Pearl City, Hawaii.
- Aug. 26—PONAPE, TRUK, GUAM, PALAU, SAIPAN—20 days, Innerspace Adv., Pearl City, Hawaii.

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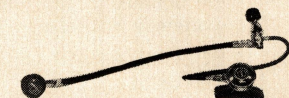
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- Aug. 28 — TRUK, GUAM, PALAU — 16 days, Innerspace Adventures, Pearl City, Hawaii.
- Aug. 30 — JAMAICA — 7 days, Elmer's Watersports, Inc., Evanston, Ill.
- Sept. — LAKE SINOIA, RHODESIA, SOUTH AFRICA — 21 days, Ruth Fry Exp., Norristown, Pa.
- Sept. 2, 16, 30 — TORTOLA, BVI — 13 days, Trimarine Misty Law, St. Thomas, V.I.
- Sept. 4 — GUAM, PALAU, SAIPAN — 11 days, Innerspace Adventures, Pearl City, Hawaii.
- Sept. 4, 11, 18, 25 — KONA, HAWAII — aboard Fair Wind, See & Sea Travel, San Francisco, Calif.
- Sept. 5, 12, 19, 26 — BONAIRE — 8 days, Lisind Int'l, New York, N.Y.
- Sept. 5, 15 — BIMINI — 7 days, Adventure Cruise, Capt. Skeet LaChance, Ft. Lauderdale, Fla.
- Sept. 6, 19 — BAHAMAS — 7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, Fla.
- Sept. 6 — COZUMEL — 8 days, See & Sea Travel, San Francisco, Calif.
- Sept. 6 — CAYMAN/ROATAN — 12 days, See & Sea Travel, San Francisco, Calif.
- Sept. 8, 14, 20, 26 — BIMINI — 5 days, Capt. Tom Guarino, Islamorada, Fla.
- Sept. 9 — BARRIER REEF MEXICO — 11 days, Windjammer Cruises, Inc., Miami Beach, Fla.
- Sept. 12 — MULEGE, BAJA CALIFORNIA — 15 days, Club Baja California, Long Beach, Ca.
- Sept. 13 — ROATAN — 8 days, Go Mexico, Inc., Minneapolis, Minn.
- Sept. 14 — COZUMEL — 8 days, Go Mexico, Inc., Minneapolis, Minn.
- Sept. 16 — CARTAGENA, COLOMBIA — 10 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Sept. 20 — BONAIRE — 9 days, See & Sea Travel, San Francisco, Calif.
- Sept. 20 — SAN ANDRES — 8 days, Go Mexico, Inc., Minneapolis, Minn.
- Sept. 21 — KONA, LANAI, MAUI, OAHU — 10 days, Innerspace Adventures, Pearl City, Hawaii.
- Sept. 21 — KONA, LANAI, MAUI, OAHU, TRUK, PONAPE — 20 days, Innerspace Adv., Pearl City, Hawaii.
- Sept. 22 — GRAND CAYMAN/IQ7 — 7 days, Horizons Int'l, Seattle, Wash.
- Sept. 23 — BAY ISLANDS CENTRAL AMERICA — 12 days, Windjammer Cruises, Inc., Miami Beach, Fla.
- Sept. 26 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Sept. 28 — BELIZE — 7 days, Go Mexico, Inc., Minneapolis, Minn.
- Sept. 29 — CABO SAN LUCAS — 5 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Sept. 29 — FLORIDA KEYS, KEY LARGO — 7 days, Fred Calhoun's U/W Safaris, Boston, Mass.
- Sept. 29 — PALM BEACH SHORES — 5 days, Fred Calhoun's U/W Safaris, Boston, Mass.
- Sept. 30 — PONAPE, TRUK — 11 days, Innerspace Adventures, Pearl City, Hawaii.
- Sept. 30 — PONAPE, TRUK, GUAM, PALAU, SAIPAN — 20 days, Innerspace Adv., Pearl City, Hawaii.
- Oct. 2 — BIMINI — 5 days, Capt. Tom Guarino, Islamorada, Fla.
- Oct. 2 — TRUK, GUAM, PALAU — 16 days, Innerspace Adventures, Pearl City, Hawaii.
- Oct. 2, 9, 16, 23, 30 — KONA, HAWAII — Fair Wind, See & Sea Travel, San Francisco, Calif.
- Oct. 3, 10, 17, 24, 31 — BONAIRE — 8 days, Lisind Int'l, New York, N.Y.
- Oct. 4, 18 — BAHAMAS — 7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, Fla.
- Oct. 4, 25 — SAN ANDRES — 8 days, Go Mexico, Inc., Minneapolis, Minn.
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- Oct. 5, 19 — COZUMEL — 8 days, Go Mexico, Inc., Minneapolis, Minn.

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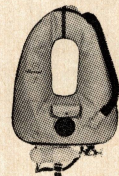
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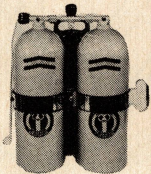
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(Continued on Page 88)



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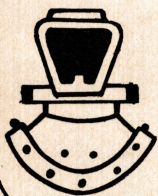
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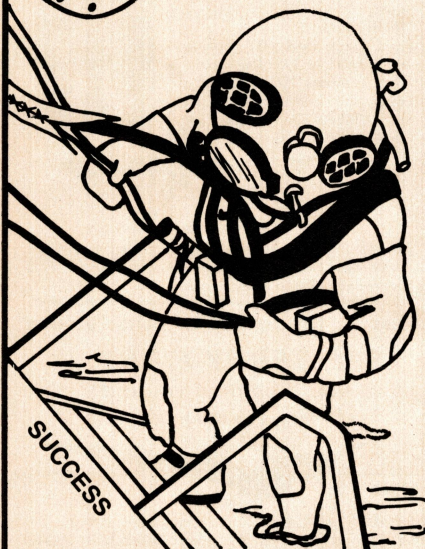
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## DRUG ABUSE

(Continued from Page 55)



making processes. Other types of behavioral toxicity are forms of reduced motor capacity and neuromuscular coordination. Familiar warnings of behavioral toxicity are often seen on the labels of nonprescription antihistamines (e.g.: "Do not operate machinery," "may cause drowsiness," etc.).

To summarize briefly: The effect of a drug is dependent to a large extent on the specific physiological makeup of an individual and the environmental factors which are prevailing at the time of administration and during the time course of the drug action.

Now that we know a little about the effects of drugs under normal conditions, we can examine their relevance to diving. In the wide variety of diving experiences, the environmental factors are rarely identical. Such parameters as increased pressure (which includes change in the partial pressures of oxygen and nitrogen), water temperature, current, and visibility can exert considerable influence on the physiological makeup of the diver. The vital question then arises, "Will the deviation from normal environmental factors to the underwater world result in a substantial change in the pharmacological and behavioral effects of a drug?" Unfortunately, for most drugs, the answer is we don't know.

Recently, at the Naval Medical Research Institute in Bethesda, Maryland, researchers have been working on this problem. Drug research is being carried out under carefully controlled conditions in hyperbaric chambers using animals as subjects. The basic rationale for these studies is to evaluate the effects of drugs under pressure and to specify compounds that will afford protection against or reduce the behavioral problems which occur at increased pressure, such as nitrogen narcosis.

The NMRI investigations have focused mainly on drugs acting on the central nervous system (CNS), since it is generally thought that the CNS is most affected by breathing air under pressure. The results of these studies have shown that the behavioral effects of drugs do change in the high pressure conditions. The effects of certain classes of drugs are increased, some are diminished, and other drugs yield entirely different effects than those seen in normal atmospheric conditions.

With regard to the diving public at large, the most important finding of the



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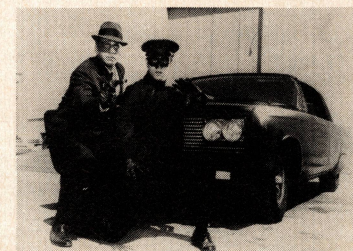
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NMRI drug program has been that the change in the behavioral effects of a drug from surface action to that under increased pressure is not predictable from its ambient pressure characteristics.

A particularly good example of the change in behavioral effects caused by the interaction of drugs and pressure is illustrated by our psychopharmacological evaluation of amphetamine. Amphetamine-type compounds such as dexedrine and methedrine were evaluated as possible protective agents against behavioral deficits associated with nitrogen narcosis. But, rather than affording protection, amphetamine reacted synergistically with pressure to cause increased susceptibility to narcosis, and severe narcotic symptoms were observed by NMRI at relatively shallow depths.

In this particular evaluation, the decrements in performance resulting from the drug under pressure were greater than with either the drug or pressure alone. This evidence strongly suggested that a diver taking amphetamine could run into serious behavioral problems at very shallow depths even when taking a dose which produces very little effect at the surface.

In looking at this evidence, I must point out that these evaluations were done under carefully controlled laboratory conditions, but not in the water. Therefore, these finds may not be completely analogous to what might occur in the open sea. As mentioned above, such factors as cold, anxiety, and the like, could alter the physiological status of the diver which might exacerbate or diminish the effect of the drug.

There are two basic lessons that should be drawn from this discussion, and I hope that all divers will remember them:

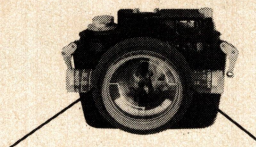
1. Taking a drug, any drug, while diving is a very risky proposition, since it is apparent that the behavioral effect of a drug changes when the organism is subjected to increased pressures.

2. The manner in which the drug effect changes is dependent on a variety of factors (physiological and environmental), which can vary so much from dive to dive that it becomes very difficult to predict accurately how a particular drug will react underwater.

The results of these and other studies being done in labs across the country have contributed important information which will lend to a fuller understanding of drugs and the physiological and behavioral disorders associated with diving. To further this effort, we could use your help. If you have had any unusual incident occur while diving that you feel was related to some medication or drug you were taking, we'd like to hear from you about it.

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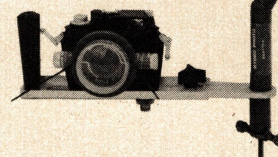
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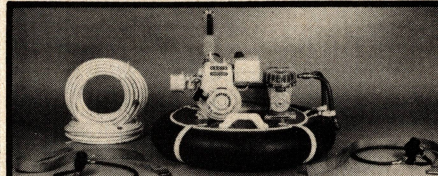
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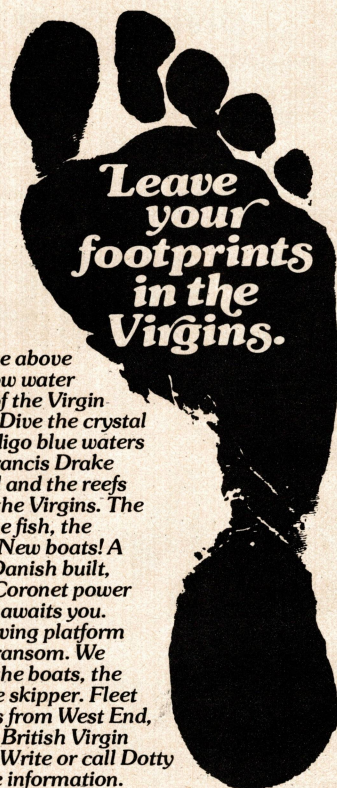
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## Dive Tour News



(Continued from Page 85)

- Oct. 9 — GUAM, PALAU, SAIPAN — 11 days, Innerspace Adventures, Pearl City, Hawaii.
- Oct. 11 — AQABA, JORDAN — 15 days, John Clark, See & Sea Travel, San Francisco, Calif.
- Oct. 11 — COZUMEL — 8 days, See & Sea Travel, San Francisco, Calif.
- Oct. 14 — BARRIER REEF MEXICO — 11 days, Windjammer Cruises, Inc., Miami Beach, Fla.
- Oct. 14 — TORTOLA, BVI — 13 days, Trimarine Misty Law, St. Thomas, Virgin Islands
- Oct. 18 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, Calif.
- Oct. 18 — BONAIRE — 9 days, See & Sea Travel, San Francisco, Calif.
- Oct. 19 — BELIZE — 7 days, Go Mexico, Inc., Minneapolis, Minn.
- Oct. 19 — KONA, LANAI, MAUI, OAHU — 10 days, Innerspace Adventures, Pearl City, Hawaii.
- Oct. 19 — KONA, LANAI, MAUI, OAHU, TRUK, PONAPE — 20 days, Innerspace Adv., Pearl City, Hawaii.
- Oct. 21 — AUSTRALIA/CORAL SEA — 17 days, Al Giddings, See & Sea, San Francisco, Calif.
- Oct. 24 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Oct. 27 — CABO SAN LUCAS — 5 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Oct. 28 — PONAPE, TRUK — 11 days, Innerspace Adventures, Pearl City, Hawaii.
- Oct. 28 — PONAPE, TRUK, GUAM, PALAU, SAIPAN — 20 days, Innerspace Adv., Pearl City, Hawaii.
- Oct. 30 — TRUK, GUAM, PALAU — 16 days, Innerspace Adventures, Pearl City, Hawaii.
- Nov. 1, 15, 29 — BAHAMAS — 7 days, Tropic Diving Cruises Inc., Ft. Lauderdale, Fla.
- Nov. 1, 22 — ROATAN — 8 days, Go Mexico, Inc., Minneapolis, Minn.
- Nov. 2, 23 — COZUMEL — 8 days, Go Mexico, Inc., Minneapolis, Minn.
- Nov. 6, 13, 20, 27 — KONA, HAWAII — aboard Fair Wind, See & Sea Travel, San Francisco, Calif.
- Nov. 6 — GUAM, PALAU, SAIPAN — 11 days, Innerspace Adventures, Pearl City, Hawaii.
- Nov. 7, 14, 21, 28 — BONAIRE — 8 days, Lisind Int'l, New York, N.Y.
- Nov. 8, 22 — CAYMAN ISLANDS — 8 days, See & Sea Travel, San Francisco, Calif.
- Nov. 8, 22 — SAN ANDRES — 8 days, Go Mexico, Inc., Minneapolis, Minn.
- Nov. 9, 23 — BELIZE — 7 days, Go Mexico, Inc., Minneapolis, Minn.
- Nov. 14 — ST. THOMAS — 7 days, Happy Wanderer, Bronxville, N.Y.
- Nov. 21 — COZUMEL — 8 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Nov. 22 — COZUMEL — 8 days, Les Newport, See & Sea Travel, San Francisco, Calif.
- Nov. 23 — KONA, LANAI, MAUI, OAHU — 10 days, Innerspace Adventures, Pearl City, Hawaii.
- Nov. 23 — KONA, LANAI, MAUI, OAHU, TRUK, PONAPE — 20 days, Innerspace Adv., Pearl City, Hawaii.
- Nov. 24 — CABO SAN LUCAS — 8 days, Sunland Int'l Tours, Beverly Hills, Calif.
- Nov. 29 — JAMAICA — 7 days, Elmer's Watersports, Inc., Evanston, Ill.
- Dec. 2 — PONAPE, TRUK — 11 days, Innerspace Adventures, Pearl City, Hawaii.

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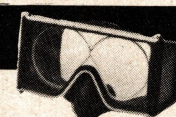
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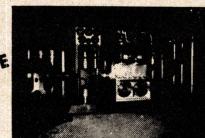
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## CDC's CANADIANS

Canada's emergence as a major oil producing nation is reflected in the rapid enrollment increase of Canadian students for courses at the Commercial Diving Center's deep sea diving school based in Wilmington, California, according to Jim Joiner, executive director.

For the second year in a row, notes Joiner, 1974 showed that 60% of the non-U.S. students came from Canada. Israel was second, followed by England, Norway, Nigeria, Korea, Australia, New Zealand, Indonesia, Malaysia, Trinidad, Mexico, and Finland, all countries contributing students who are taking advantage of the qualified deep sea diving course offered by CDC.

The school's parent corporation, Oceaneering International, headquartered in Houston, Texas, is the world's largest independent diving contractor, and Can-Dive in Vancouver and St. John's are part of Oceaneering's world wide offshore oilfield operations.

Canadian graduates of CDC enjoy preferential hiring on Commonwealth areas where work permits are difficult to obtain by U.S. divers.

Canadian graduates of CDC are now working in offshore oilfield diving areas such as the North Sea, Singapore, the Persian Gulf, England and Scotland.

Certain Canadian Provinces offer tuition assistance to those wishing vocational training, and the Saskatchewan Department of Continuing Education is sponsoring a Canadian student at CDC.

For income tax purposes, CDC is a post-secondary school, and certain tax advantages are available for Canadian students who attend the school. With years of experience in solving foreign student problems, CDC streamlines the administrative processes to assist Canadian students in obtaining U.S. entry documents, arrival reception, housing, and exit processes.

Many foreign students come to the United States for training in the air/mixed gas deep sea diver training, and Commercial Diving Center is the only school in the world offering the advanced Bell/Saturation training with an operational deep diving system. Bell/Saturation training is becoming more and more sought after by diving companies who wish to hire people able to utilize the constantly updated newer equipment and innovations for ocean research which allows deeper penetration of our seas. For more information about CDC, contact: Commercial Diving Center, 272 South Fries Avenue, Wilmington, Calif. 90744. Telephone: (213) 834-2501.

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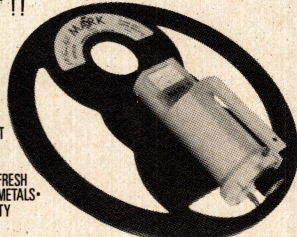
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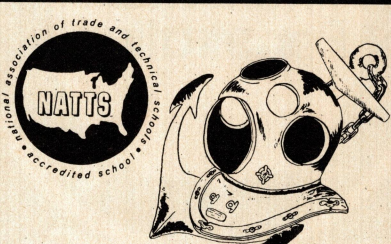
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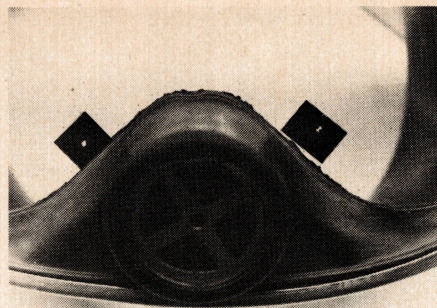
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BY NORRIS S. WYNNE

Having reached that point in life when tilting the head back in order to bring the close-up lens of my bifocals in line with the reading material, I am only one of many divers with a common problem — reading the dials and gauges at 50 feet.

For some time I have continued to insist that I could get by without corrective lenses while diving. I had memorized the numbers on the face of my watch, pressure gauge and depth meter, and although I couldn't actually read the numbers, I could count the spots on the dial in clockwise fashion and get a pretty good indication of time, pressure or depth.

As this handicap progressed and became compounded by another symptom of middle age (forgetting which dial was which) I began looking for a prescription mask lens. I initially rejected the glue-on type as being too costly since I only needed the reading portion and not the distance lens. Hoping to economize I bought a mask which was designed to accept regular eyeglasses with the ear pieces removed. This wasn't completely satisfactory because of fog and an inability to prevent water drops from collecting and distorting my vision. A second effort was the purchase of a device which fits into the face mask. This is essentially a plastic frame in which lenses are fitted. It is easily removable and has been somewhat more satisfactory but still fogs and collects water droplets.

While giving some serious thought to making the big purchase of a prescription mask, the thought occurred to me that the principle of the pinhole camera may offer a solution. Without attempting a scientific explanation, it is a simple fact that light passing through a small hole refracts much in the same manner as light passing through a lens. With much enthusiasm I drilled a variety of small holes in a piece of plastic and went to the pool. I found that I could clearly read my watch by peeking through the holes. I also found that the focal length of the larger holes was longer than the smaller holes.

Back to the work bench with renewed enthusiasm I punched a variety of holes in a piece of thin stick-on plastic. The material used was a piece cut from the stick-on numbers which are available at marine dealers and mail order supply

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## SKIN DIVERS WATCH

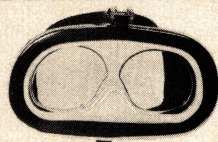


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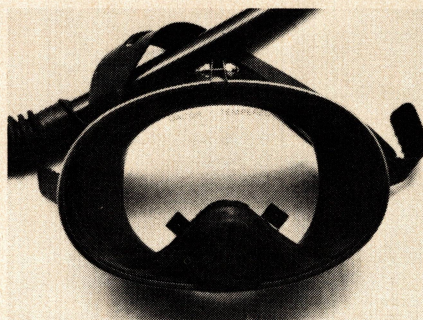


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houses for use in marking boat registration numbers and names.

After considerable experimentation I decided on the use of a small piece of the plastic measuring about 3/8" X 1/2".



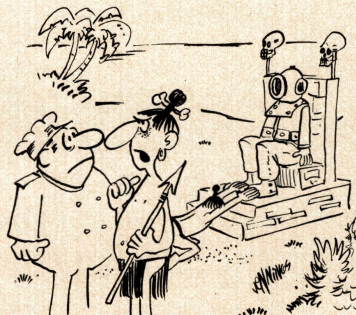
The holes are made with a sewing needle or pin heated with a match or cigaret lighter. The pin must be hot in order to get a clean hole. I made several holes in each piece of plastic. While wearing the mask, I located the exact position on the face plate by focusing on my watch held at a distance of approximately 15 inches.

I tried placing the plastic pieces on the inside of the mask but found this to be unsatisfactory. Apparently a small amount of water will sooner or later find its way to the pinhole and completely eliminate the lens effect on the air side of the face plate. However, when on the outside, it assumes the characteristics of the surrounding water and the lens effect is apparent.

Additional experimentation has shown that a single hole is perhaps more effective than several. Lettering tape which is used in hand lettering machines works equally as well as the material cut from the plastic numbering material. A single pinhole lens may be satisfactory rather than two. This would eliminate the need to line up the line of sight as when two lenses are used.

A minor drawback to the pinhole lens is that the amount of light passing through is somewhat reduced. Nonetheless, it will still be adequate for most sport diving situations with average light.

Now, I make no claims that this little trick is going to provide the quality or perhaps the comfort of a well made, professional quality prescription face plate. I do, however, say that it is a satisfactory way in which many divers can read the gauges for about 10¢.



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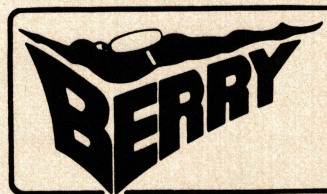


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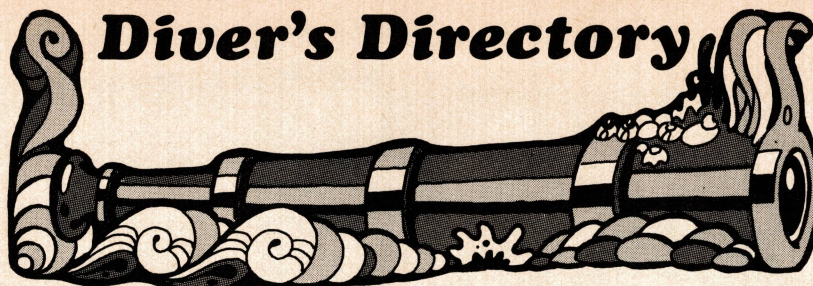
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(continued on next page)



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(Continued from preceding page)

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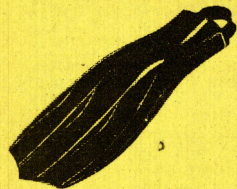
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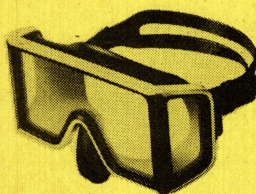


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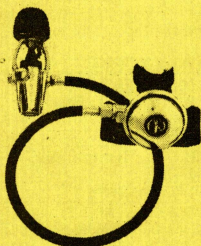
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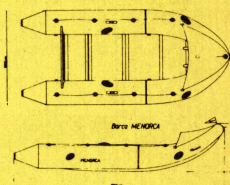
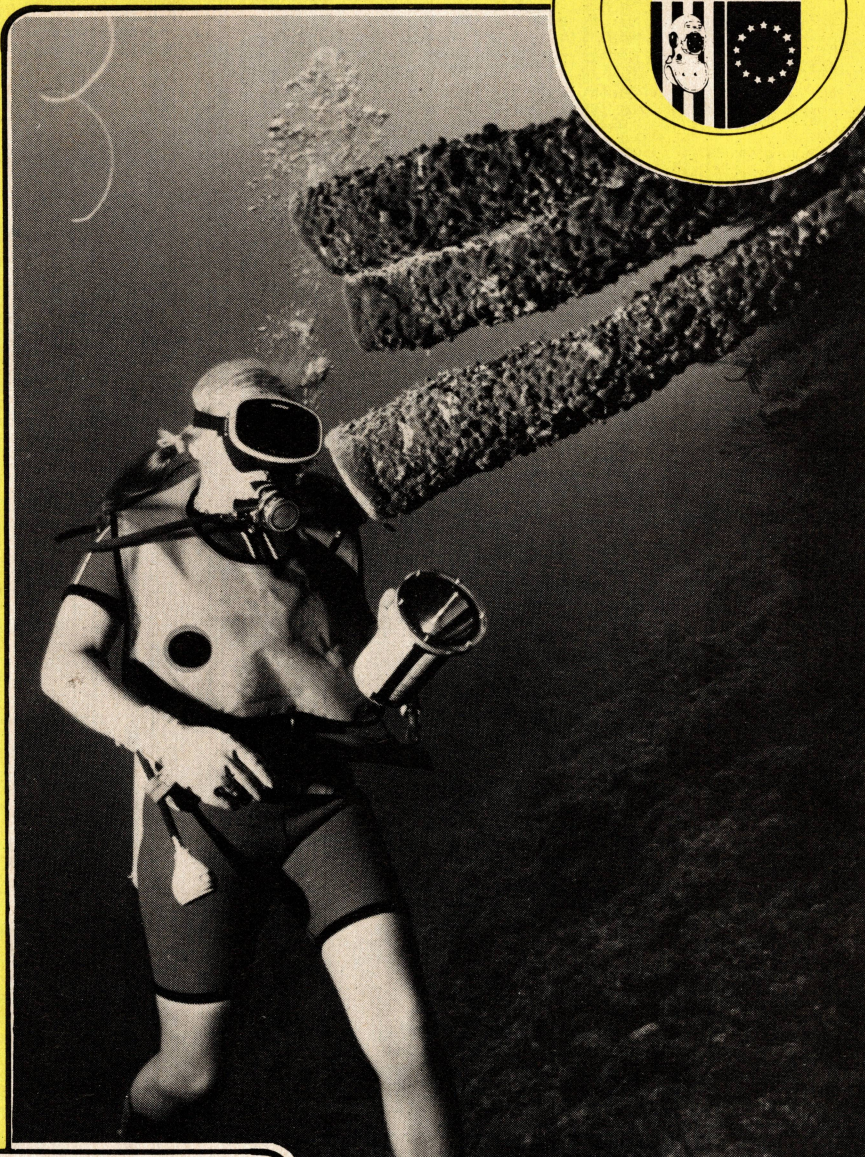
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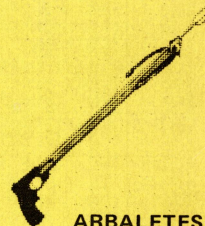


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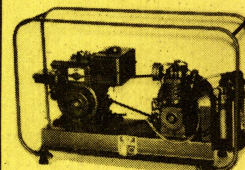
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